

Counterpoint Global Insights

Public to Private Equity in the United States: A Long-Term Look

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Introduction

Over the past quarter century there has been a marked shift in U.S. equities from public markets to private markets controlled by buyout and venture capital firms. This change has had reverberations for asset managers, investors, executives, and policy makers.

In this report we seek to answer the following questions:

- What have been the major drivers behind the shift from public to private equities in the U.S.?
- Why are there fewer public companies today than there were 25 years ago?
- What are the long-term trends in buyouts?
- What are the long-term trends in venture capital?
- Where do we go from here?

Markets have become more sophisticated over time as the result of the growth in institutional money management, financial innovation, and sharply lower technology costs. Large institutional investors, including pension funds and endowments, face the prospect of swelling future liabilities and diminished expected returns for most asset classes. As a result, they have reduced their portfolio allocation to public securities and have increased their allocation to private equity, where returns have historically been higher.

From the end of World War II through the early 1970s, many companies went public to raise capital to fund their growth. Today, young companies often rely more on intangible assets and have a less voracious appetite for capital. They also have unprecedented access to capital through the private markets. Consequently, many young companies have elected to stay private longer than did the companies of prior generations.

AUTHORS

Michael J. Mauboussin
michael.mauboussin@morganstanley.com

Dan Callahan, CFA
dan.callahan1@morganstanley.com

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Executive Summary

- Over the past quarter century there has been a marked shift in U.S. equities away from public markets to private markets controlled by buyout and venture capital firms. This change has had reverberations for asset managers, investors, executives, and policy makers.
- U.S. domestic equity mutual funds manage about \$8.4 trillion, with active funds controlling \$5.6 trillion and index funds \$2.8 trillion at year-end 2019. Buyout funds in the U.S. have \$1.4 trillion in assets under management (AUM), including \$560 billion in “dry powder.” Venture capital funds have AUM of approximately \$455 billion, which includes dry powder of \$120 billion. The equity capitalization of the U.S. stock market is roughly 27 times the size of AUM for buyout funds and more than 80 times the size of venture capital funds.
- The median public market equivalent (PME) return has been about 1.2 for buyout funds and 1.0 for venture capital over the last 30 years. These headline figures belie a lot of complexity. For example, competing data sources produce different results, and the returns for managers are highly dispersed.
- Returns for top venture capital funds are persistent, whereas there is limited evidence for persistence in buyout funds since 2000.
- Drivers of the shift from public to private equity include investors seeking higher returns, changes in institutions and technology, and legislation.
- There are about 3,600 public companies in the U.S. today, about one-half as many as there were in 1996 and three-quarters as many as there were in 1976. The drop reflects active M&A activity and a low level of initial public offerings (IPOs). More than 90 percent of the stocks that have disappeared since 1996 were those of small- and micro-capitalization companies.
- The drop in listings means that public companies today are much larger and older on average than the past population of companies. M&A has led to more concentration in most industries, and listed companies also have a high proclivity to pay out capital.
- Buyout activity has been up in the last few years, albeit still below the peak of 2007. On average, deals are now larger and more expensive than those of the past.
- Exits for buyouts are dominated by strategic sales to other companies. In recent years, there has been rapid growth in sales to other private equity firms.
- There is a strong negative correlation between the average price paid for businesses and subsequent PME in the buyout business. Multiples in 2019 were at a record. This concern is partially mitigated by low interest rates.
- Venture capital is more cyclical than either public markets or buyouts, and recent annual investment levels have been high.
- Exits in venture capital (VC) used to be primarily via IPOs, but today sales to other companies dominate. The average age of a company at IPO is higher than before, and VC firms wait longer to do IPOs.

Introduction

We can point to a few drivers of the move from public to private equity. There has been a meaningful evolution in the form in which companies invest. Tangible investment was double that of intangible investment in the mid-1970s, and intangible investment is one-and-a-half times tangible investment more recently.¹ As a consequence, companies need less capital to fund their operations and hence the demand to raise capital through public markets has diminished.

In recent decades, sophisticated investors, including pension funds and endowments, have moved their asset allocation toward private markets in search of higher returns. For example, Yale University's endowment, run by its chief investment officer David Swensen since 1985, has delivered excellent long-term returns and is considered a pioneer in asset allocation. When Swensen took the helm in the mid-1980s, about 65 percent of the portfolio was allocated to U.S. equities, 15 percent to U.S. bonds, and none to private equity. Today, U.S. equities, bonds, and cash are less than 10 percent of the endowment's target asset allocation.²

Further, companies have raised more money in private markets than in public markets in each year since 2009. For example, companies raised \$3.0 trillion in private markets and \$1.5 trillion in public markets in 2017.³ These changes in how investors invest and how companies raise capital have important implications for holding periods, the perceived volatility of the returns, and liquidity.

Regulation and legislation have also played an important role in the evolution of capital markets. A company's propensity to go public can be framed as a cost-benefit analysis, and the costs have risen since the 1990s.⁴ In addition, the Department of Justice and the Federal Trade Commission, which review mergers, have been accommodating for acquirers in recent decades, and many industries have become more concentrated as a consequence.

Finally, there is the role of the "institutional imperative," which Warren Buffett, chairman and chief executive officer of Berkshire Hathaway, describes as "the tendency of executives to mindlessly imitate the behavior of their peers, no matter how foolish it may be to do so."⁵ David Swensen wrote a very influential book called *Pioneering Portfolio Management*. Yale moved into alternative investments early and as a result generated high investment returns.⁶

Many other endowments and pension funds have sought to follow suit, shifting their asset allocations away from a traditional mix of stocks and bonds toward a greater weighting of alternative investments, including buyout and venture capital funds. As we will see, there was a substantial benefit to being early and having the ability to find skilled managers.

We now start our tour by examining where we are today. We focus on U.S. public equities, buyout funds, and venture capital funds. We do not cover other important alternative assets, including non-U.S. buyout and venture capital, real estate, private debt, natural resources, and infrastructure. That said, the U.S. asset classes we cover are generally the largest and oldest. Private equity technically refers to both buyout and venture capital funds, but it is common for industry professionals use buyout funds and private equity interchangeably.

Lay of the Land

We start by examining the size, investor flows, and investor returns for U.S. public equities, buyout funds, and venture capital funds. As of year-end 2019, there were approximately 3,640 listed companies in the U.S. employing 42 million people, roughly 7,200 firms owned by private equity buyout funds employing 5.4 million, and 18,400 companies backed by venture capital firms employing 1.1 million.⁷ The average market capitalization for a public company today is roughly \$10.4 billion, up from about \$700 million in 1976, adjusted for inflation.

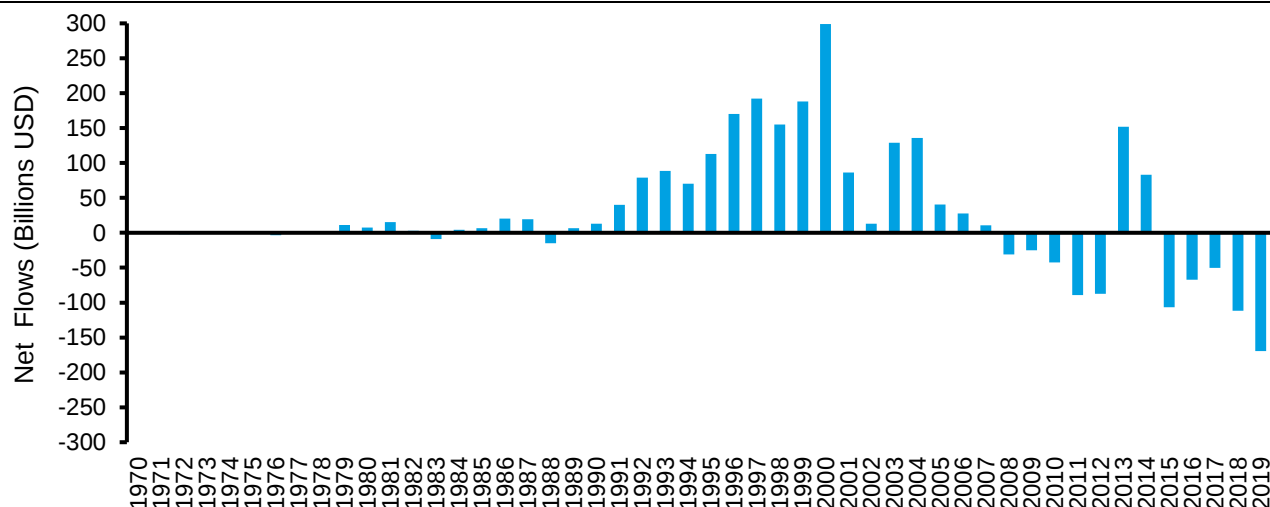
U.S. domestic equity mutual funds manage about \$8.4 trillion, with active funds controlling \$5.6 trillion and index funds \$2.8 trillion, at year-end 2019, according to the Investment Company Institute (ICI). These figures do not include \$4.7 trillion in separately managed accounts. The capitalization of U.S. public equities was approximately \$38 trillion as of December 31, 2019.

Buyout funds in the U.S. have \$1.4 trillion in AUM as of September 30, 2019. This includes \$560 billion in “dry powder,” money committed by limited partners but not yet drawn. Because buyout firms acquire companies using a substantial amount of debt, purchasing power is higher than dry powder.

Venture capital funds have AUM of approximately \$455 billion, which includes dry powder of \$120 billion.⁸ Notwithstanding the desire of many large investors to increase their exposure to private equity, the market capacity is substantially smaller than it is in public markets.

Investor Flows. Exhibit 1 shows investor flows into U.S. equity mutual funds and equity exchange traded funds (ETFs) from 1970 through 2019. Flows followed the market for much of this period: investors purchased equity funds after the market rose and sold after the market fell. In recent years, this relationship has weakened and equity funds have seen outflows even when the stock market had attractive returns. For example, investors withdrew \$170 billion in 2019 even though the S&P 500 had a total return of 31 percent.

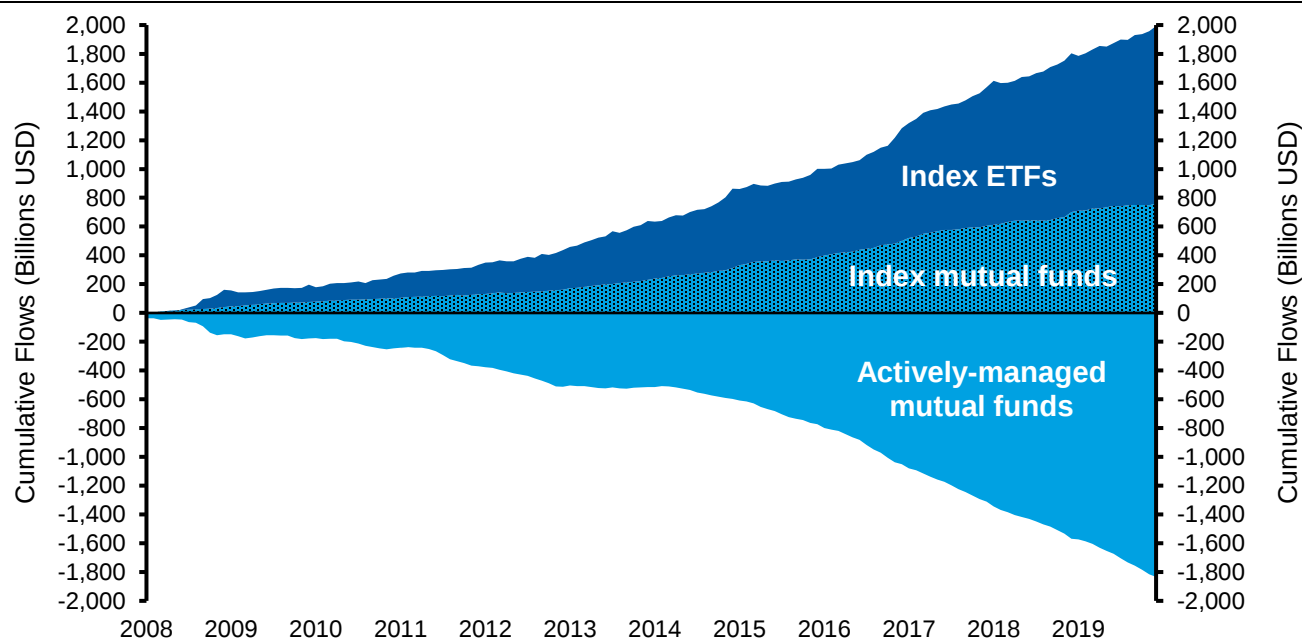
Exhibit 1: Investor Flows into U.S. Equity Mutual Funds and ETFs, 1970-2019



Source: Investment Company Institute.

Note: Equity mutual funds (1970-1992), domestic equity mutual funds (1993-2019), and domestic equity ETFs; Mutual fund data is net new cash flow; ETF data is net share issuance.

The big story in the U.S. public equity markets is the shift from active to indexed, or rules-based, funds. Exhibit 2 shows that since 2008, investors have directed \$2.0 trillion into index mutual funds and ETFs and more than \$1.8 trillion out of active funds.⁹ Investors have shifted their equity allocations from actively-managed equity funds to index funds and private equity.

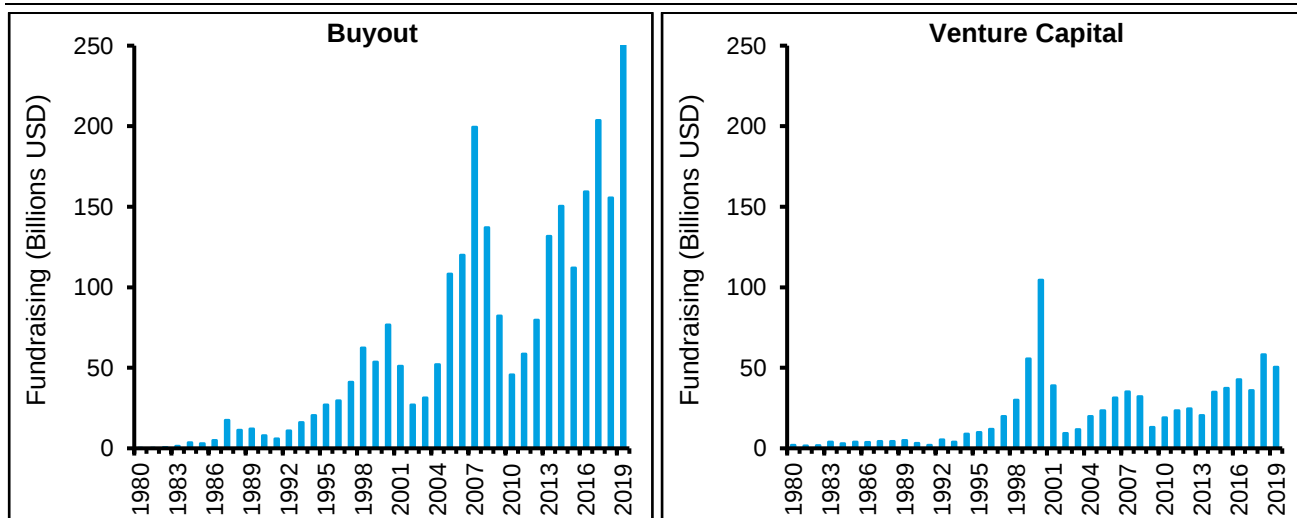
Exhibit 2: Cumulative Flows from U.S. Active to Passive Funds, 2008-2019

Source: Investment Company Institute.

Note: U.S. domestic equity funds; Mutual fund data is net new cash flow plus reinvested dividends; ETF data is net share issuance and includes reinvested dividends.

Similar to public equities, investor commitments to buyout funds have been cyclical (left panel of exhibit 3). Fundraising was modest in the 1970s and early 1980s but saw a pickup during the first leveraged-buyout (LBO) wave in the late 1980s, which was capped by Kohlberg Kravis Roberts & Co.'s (KKR) acquisition of RJR Nabisco in 1988 for \$25 billion, or \$51 billion in today's dollars after adjusting for inflation.

Buyouts became more popular in the mid-1990s, declined during the three-year bear market at the turn of the century, and grew steadily through the first half of 2008. The financial crisis precipitated another drop, only to be followed by strong increases in recent years.

Exhibit 3: Investor Commitments to U.S. Buyout and Venture Funds, 1980-2019

Source: 2010 and 2020 NVCA Yearbooks and PitchBook.

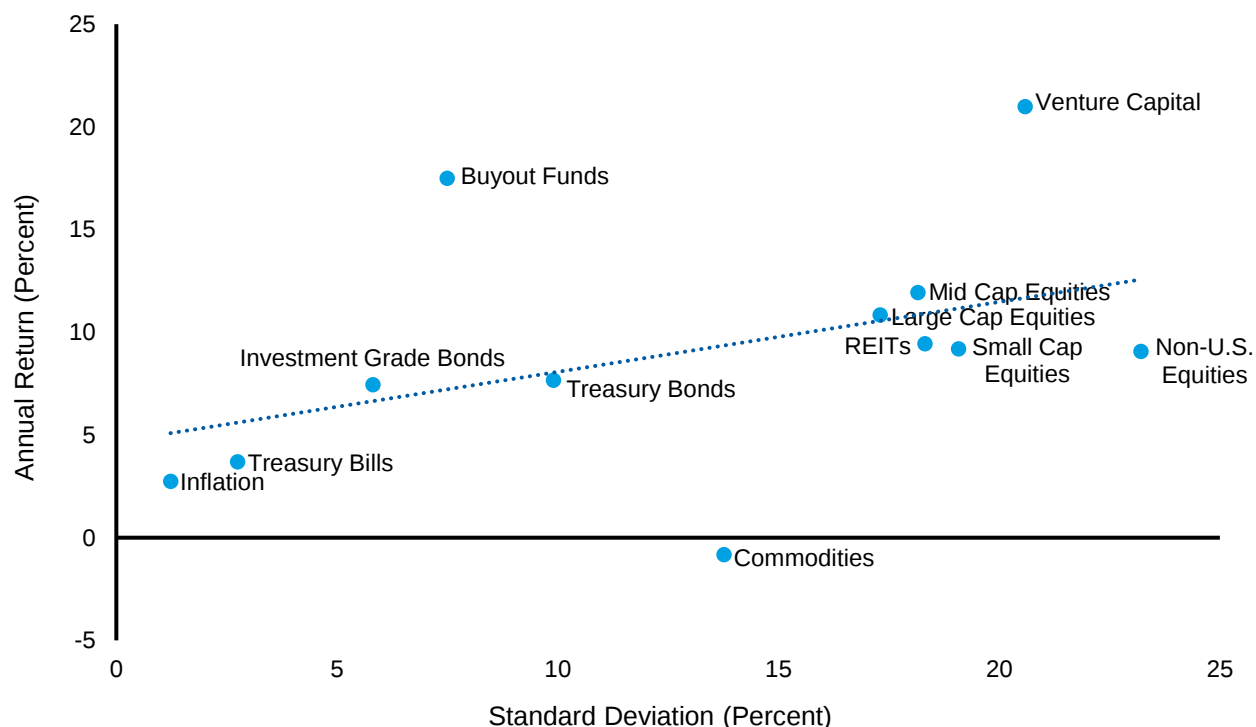
Note: 1980-2005 buyout data includes commitments to mezzanine capital.

Commitments to venture capital have also followed cycles (see right panel of exhibit 3). What stands out is the substantial inflow into venture capital in the late 1990s during the dot-com boom. Flows have risen steadily, albeit at a reduced level, since the dot-com bust. Note that we have used the same scale for buyouts and venture capital to make it clear that the venture business is much smaller than the buyout business, which in turn is much smaller than the public market. One observation that is true for buyout and venture capital is that periods of strong investor commitments are generally followed by periods of weak returns.

We now examine investor returns while considering a number of issues. To start, it is important to recognize that measuring the returns of private equity funds is inherently more difficult than it is for mutual or hedge funds because the funds only report returns periodically, there is no standard for how to mark to market, and fund results are much more heavily skewed. That said, some general patterns emerge.¹⁰

Risk and Reward. Exhibit 4 plots the risk, measured as standard deviation, and return for buyout and venture funds along with a number of other asset classes from 1984 through 2015. Standard deviation is a measure of how much the annual returns are spread out. Venture capital funds provided the highest returns and the second-highest risk. Buyout funds generated the second-highest returns and risk in the bottom third of the asset classes. Large capitalization equities, for which the S&P 500 is a good proxy, had lower returns than buyout and venture with risk in the middle of the two. Because there is discretion in how private funds report their returns, some academics have argued that the risk is understated.¹¹

Exhibit 4: Risk and Reward for Asset Classes, 1984-2015



Source: Robert S. Harris, Tim Jenkinson, and Steven N. Kaplan, "How Do Private Equity Investments Perform Compared to Public Equity?" *Journal of Investment Management*, Vol. 14, No. 3, Third Quarter 2016, 1-24; Steve Kaplan, "What Do We Know About Private Equity Performance?" Guest Lecture at Miami Herbert Business School, January 31, 2020; Steve Kaplan, "What Do Venture Capitalists Do? How Well Have They Done?" University of Chicago Booth School of Business; FactSet; NAREIT; Refinitiv; and Aswath Damodaran.

Note: Past performance is no guarantee of future returns; All asset classes reflect 1984-2015 except for VC, which reflects 1984-2013; Return for Buyout and VC is measured by weighted average internal rate of return (IRR); All asset classes are for the U.S. except for Non-U.S. Equities and Commodities (Buyout and VC have a North American focus).

Private funds often report their investor returns using internal rate of return (IRR) or a measure of return on capital, including “multiple on invested capital” (MOIC) and “total value to paid-in” ratio (TVPI). Both have limitations. IRR’s most significant flaw is that it assumes investors can reinvest interim cash flows at the IRR, which is rarely true. Further, funds perform the calculation inconsistently from one another and IRR does not refer to a benchmark. In many cases, IRR overstates returns.¹²

Some fund managers have sought to enhance their IRRs by using subscription lines of credit. Instead of calling capital directly from limited partners, the general partner borrows money from a bank. Shortening the time that the capital of the limited partners is invested boosts the IRR. These lines of credit have gone from a fairly modest \$150 million in 2014 to about \$20 billion in 2019 and increased the annualized IRRs by 2.6 percentage points for the funds that used them.¹³

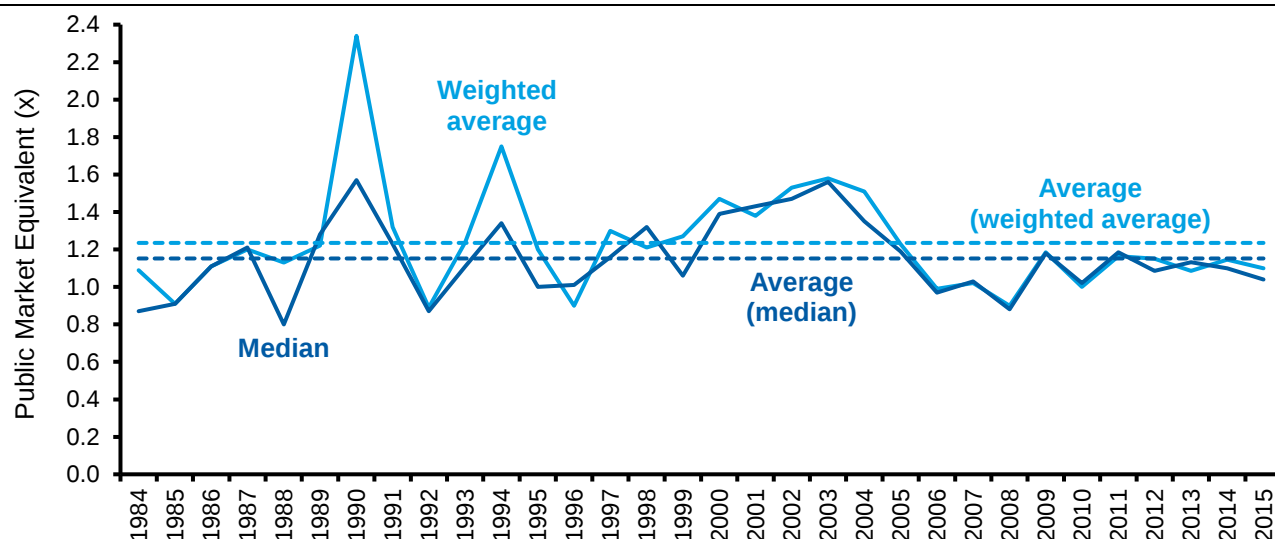
MOIC and TVPI are absolute measures of return but can be difficult to assess and compare. For example, getting 1.5 times paid-in capital is great over one year but much less attractive over 5 years. Similar to IRR, there is no reference to a benchmark.

To address some of the shortcomings of IRR and MOIC, academics have developed the concept of public market equivalent (PME), which attempts to make a direct comparison between returns for investors in private equity and public markets. PME is generally reflected as a ratio between private equity and public market returns. A ratio above 1.0 reveals relative outperformance and below 1.0 means underperformance.¹⁴

Here’s an example of how PME works. Say a fund drew \$200 million from its investors in January 2013 and paid out \$500 million in December 2017. An investor could have alternatively invested the \$200 million in the S&P 500, which would have returned \$416 million over the same period. The PME would be 1.2 (\$500/\$416). Academics and practitioners often make adjustments for risk to make the returns more comparable.

Exhibit 5 shows the median and weighted-average PMEs for buyout funds from 1984 through 2015. The most recent figures include funds that have not realized their full returns. The median and weighted average over the full period was about 1.2, and closer to 1.1 considering adjustments for size, sector, and leverage.¹⁵

Exhibit 5: Public Market Equivalent Returns for U.S. Buyout Funds, 1984-2015

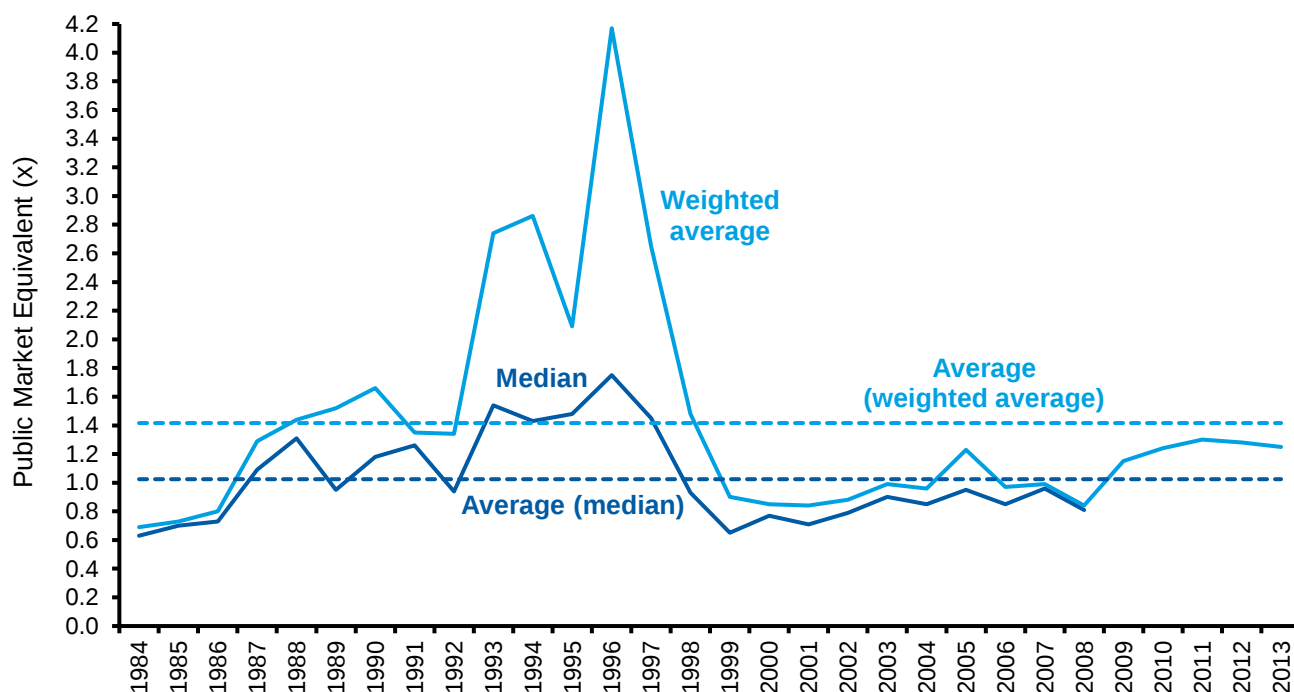


Source: Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, “Private Equity Performance: What Do We Know?” *Journal of Finance*, Vol. 69, No. 5, October 2014, 1851-1882 and Steve Kaplan, “What Do We Know About Private Equity Performance?” Guest Lecture at Miami Herbert Business School, January 31, 2020.

Note: Past performance is no guarantee of future returns; Sources use Burgiss data.

Exhibit 6 shows the median and weighted-average PME for venture capital funds from 1984 through 2013. Here again, more recent figures include funds that have not realized their full returns. The weighted average has typically exceeded the median. But when viewing them together the basic story is that PMEs were around 1.0 in the late 1980s, rose sharply during the 1990s technology boom, and then have drifted back toward 1.0 since 2000. Note that gathering consistent data is notoriously difficult.¹⁶

Exhibit 6: Public Market Equivalent Returns for U.S. Venture Capital Funds, 1984-2013



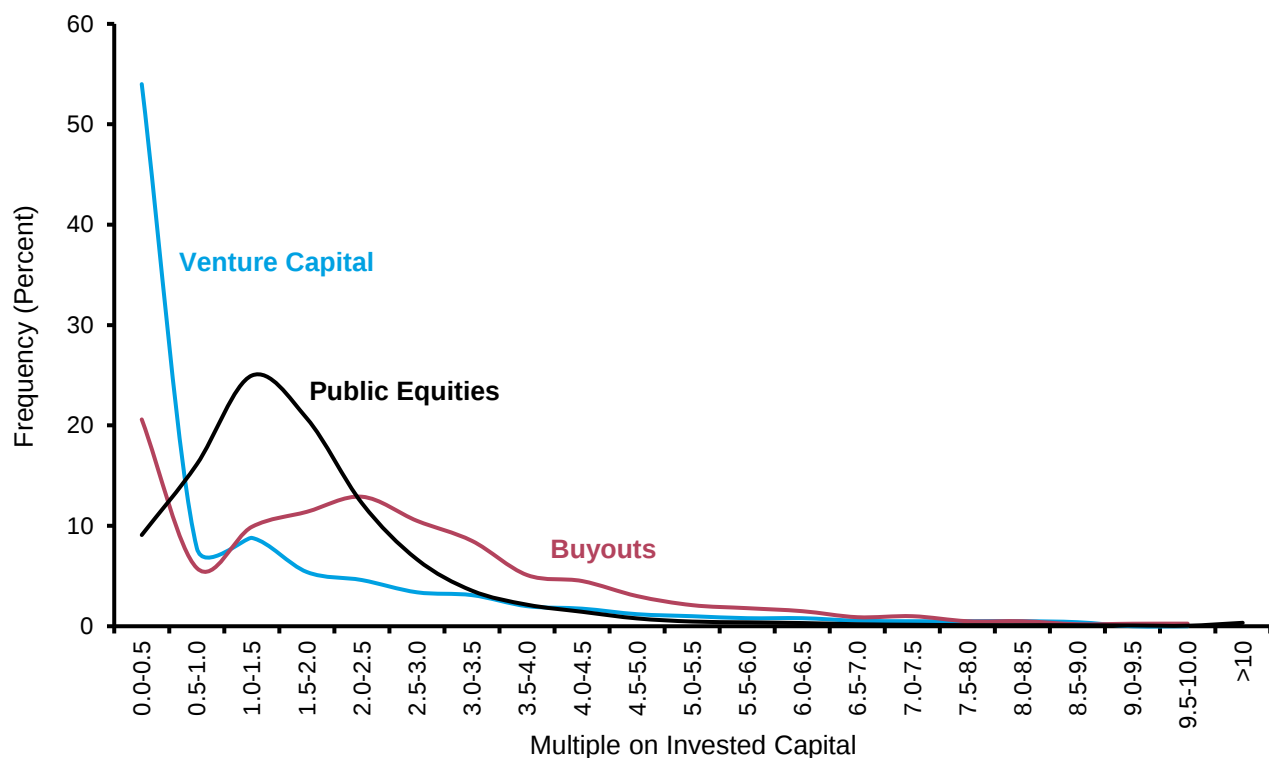
Source: Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, "Private Equity Performance: What Do We Know?" *Journal of Finance*, Vol. 69, No. 5, October 2014, 1851-1882 and Steve Kaplan, "What Do Venture Capitalists Do? How Well Have They Done?" University of Chicago Booth School of Business.

Note: Past performance is no guarantee of future returns; Sources use Burgiss data.

Distribution of Investment Returns. The distribution of returns for individual investments is quite distinct for public equities, buyout funds, and venture capital funds. Exhibit 7 examines the multiple on invested capital for 15,000 global buyout investments and 30,000 global venture capital investments, mostly from the mid-1990s to 2018. It also shows about 30,000 observations of 5-year returns for stocks in the Russell 1000, generated by collecting thirty increments of 5-year returns from year-end 1985 through year-end 2019. We selected a five-year horizon for public equities because it is roughly in line with the average holding period for private equity.

Venture capital has the most investments that lose money but also has more big winners. Buyout funds have more losers than public equity but also have more winners. Only about one-quarter of public stocks lose money during this period, but the skew to the right is more modest than for either venture capital or buyouts.

Exhibit 7: Distribution of Returns in Public Equities, Buyouts, and Venture Capital



Source: Gregory Brown, Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David Robinson, "Private Equity Portfolio Companies: A First Look at Burgiss Holdings Data," SSRN Working Paper, March 3, 2020 and FactSet.

Note: Past performance is no guarantee of future returns; Sources use Burgiss data.

Given these underlying distributions, it comes as no surprise that returns for venture capital funds, and to a lesser degree buyout funds, are skewed. You earn returns much higher than the median if you are invested with funds in the top quintile.¹⁷

Such imbalanced returns are nothing new. Tom Nicholas, a professor of business administration at Harvard Business School, compares venture capital returns to those of whaling voyages and shows that the payoffs are very similar. The amount of oil and whalebone the ship returned to port, which determined the payoff from whaling voyages, was highly variable.¹⁸

The general picture that emerges is that buyout funds have added value relative to public market investments, although the jury is out on the returns of funds raised in recent years.¹⁹ The median return for a venture capital fund has been unremarkable over the decades, save for the technology boom of the 1990s.²⁰ But investing with the best funds provided consistently attractive PME returns. This leads to the idea of return persistence.

Persistence. Persistence is strong when the next result has a high and positive correlation with the last result. Funds that have done well continue to do well, and funds that have performed poorly continue to underperform.

Research shows that both buyout and venture capital fund returns were persistent prior to 2000. Since 2000, however, venture capital fund returns have remained persistent while there is less evidence that buyout fund returns have.²¹ Some scholars attribute the persistence of VC returns to "preferential access" to subsequent attractive investments as the result of better-than-average results with initial investments.²²

We can summarize this section with a few observations. First, notwithstanding the substantial growth and popularity of U.S. buyout and venture capital funds, the public market remains vastly larger. Today, the equity capitalization of the U.S. stock market is roughly 27 times the size of the AUM for buyout funds and more than 80 times the size of venture capital funds.

Investors have been taking money out of public equities in the U.S., with net outflows of about \$500 billion from domestic equity mutual funds and ETFs over the past 5 years. (These have been more than offset by approximately \$3 trillion in company share buybacks.²³) But the bigger story is the reallocation of money invested in the equity market from actively-managed funds to indexed or rules-based funds, including traditional index funds and ETFs.

Investor commitments to U.S. buyout funds have increased steadily in recent years and in 2019 surpassed the peak preceding the financial crisis. Commitments to venture capital funds are also near record levels excluding the extraordinary inflow in 2000, which remains almost twice as large as any other year. Combined, the commitments to U.S. buyout and venture funds were about \$315 billion in 2019.

In 40 years through 2019, the S&P 500 Index had a total return of 11.8 percent. Buyout funds came to prominence in the late 1980s and have generated attractive public-market equivalent returns since then. That said, since 2000 the returns appear to be coming down and large capital raises, combined with historically high valuation levels, may portend more modest returns in the future. Further, the persistence of returns has declined in recent decades.

The public-market equivalent return for venture capital funds has been uninspiring in the aggregate save for a strong period during the technology boom in the 1990s. In this case, the aggregates belie a meaningful and persistent gap between the best and the worst funds.

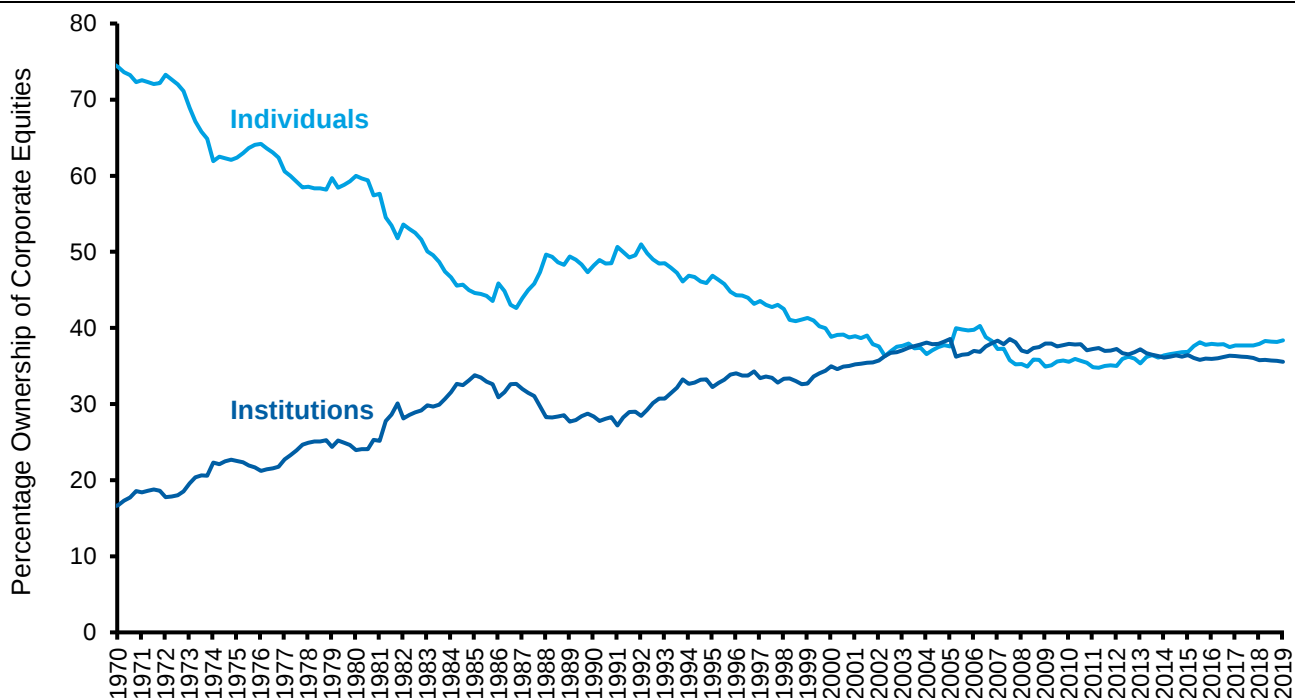
Drivers of Change

We now turn to the drivers of the trend from public to private equity. These include the nature and desires of investors, the impact of technology, and legislative change. We examine each in turn.

Investors. Analyzing companies and figuring out their value has never been easy, but institutional investors are better equipped to do it than are individual investors. In 1970, individuals held roughly 75 percent of public equities and the institutional investment management industry was nascent (see exhibit 8). For example, we estimate that the number of chartered financial analyst (CFA) charterholders per public company increased from roughly 1 in 1976 to 27 in 2019.

This sophistication brought with it more complexity. Financial innovation, including option pricing models, along with rising computing power and declining computing costs, ushered in a new era of finance. This led to changes within public markets, including the rise of indexing and the migration from public to private markets.

Exhibit 8: Shift in U.S. Equity Investors from Individuals to Institutions, 1970-2019



Source: Federal Reserve.

Note: Institutional investors include insurance companies, private pension funds, mutual and closed-end funds, and ETFs.

Perhaps the simplest explanation for the shift from public to private equity is the needs and demands of institutional investors. For most pension funds and endowments, the primary investors in U.S. private equity, liabilities have increased while expected asset returns have decreased. For example, a large gap has opened between the assets and liabilities for pension funds in the U.S. Estimates for these unfunded pension liabilities run from about \$1.6 to \$6 trillion, depending on the method and assumptions you use.²⁴

There are three levers to reduce the gap: contribute more to the plan, provide less to the beneficiaries, or generate a higher return on the assets under management. Since the first two levers are not popular, most chief investment officers strive for the third.

The yield on the U.S. 30-year Treasury bond peaked in September 1981 at 15 percent. Since then, it has mostly been on a one-way slide to a recent low of 1.2 percent. The standard way to estimate expected returns in finance is to start with a risk-free rate (usually the yield of a Treasury bill, note, or bond) and add a risk premium. The principle is that the riskier an asset is the higher its expected return. If you want more return, you have to seek more risk.

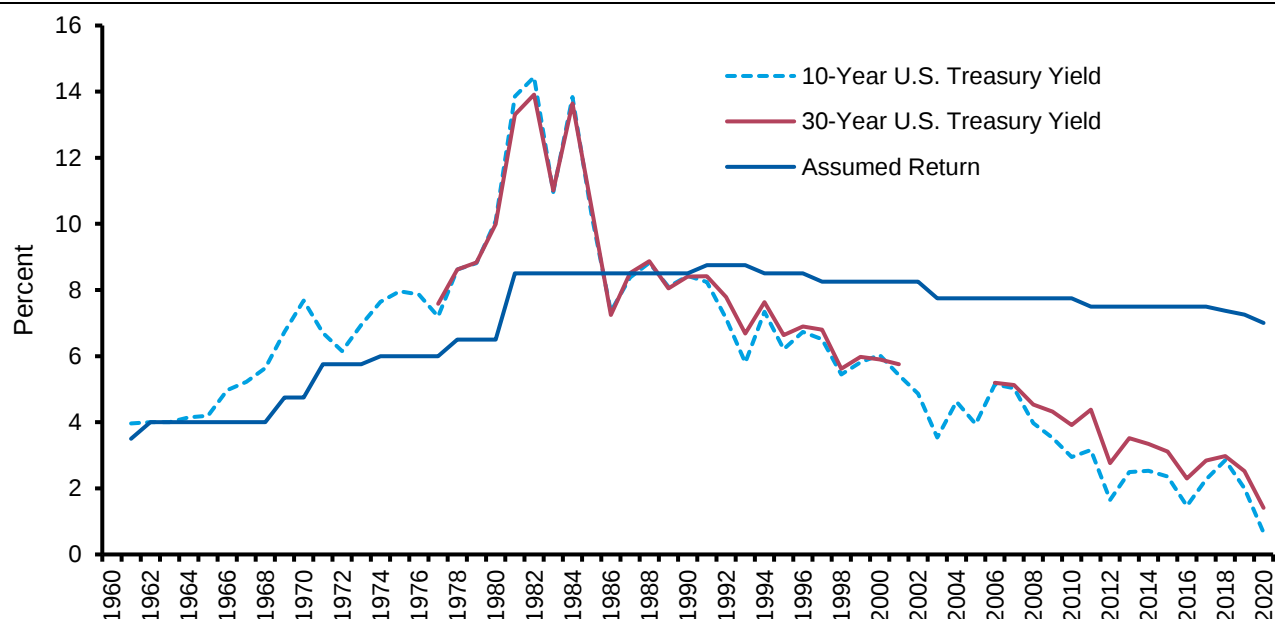
Consistent with this, recent research shows that one of the best predictors of buyout activity is the risk premium.²⁵ The evidence suggests that total buyout activity is high when the aggregate risk premium is low. This fits with the idea that investors in buyout funds seek higher returns when the risk premium, and hence the expected return, is low.

Exhibit 9 shows the assumed rate of return on pension assets for the California Public Employees' Retirement System (CalPERS) along with the yields on 10- and 30-year U.S. Treasury securities from 1961 through 2020. CalPERS had about \$350 billion in assets as of late 2019. The assumed return in 1962, at 4 percent, was about equal to the yield on the Treasury note. Through the early 1980s, the plan's assumed rate of return was consistently below the yield on Treasury securities.

By 1992, the assumed return had drifted up to 8.75 percent and the yield on the 30-year Treasury bond was about 7.75 percent, which meant the fund only had to earn a risk premium of about 1 percentage point to satisfy its return objective.

At the beginning of the 2021 fiscal year, the assumed return is a more modest 7 percent but the yield on the 30-year Treasury bond is 1.4 percent, implying a risk premium of 5.6 percentage points. The chief investment officers of pensions and endowments, and the boards that serve the beneficiaries, have little choice but to seek risk in order to generate higher returns. For example, in June 2020, CalPERS announced that it would add leverage of up to 20 percent of fund value, or \$80 billion, in order to increase the portfolio's expected risk and reward.²⁶ Historically, buyout and venture capital funds have helped meet the demand for returns.

Exhibit 9: CalPERS's Assumed Rate of Return and Yields on Treasury Securities, 1961-2020

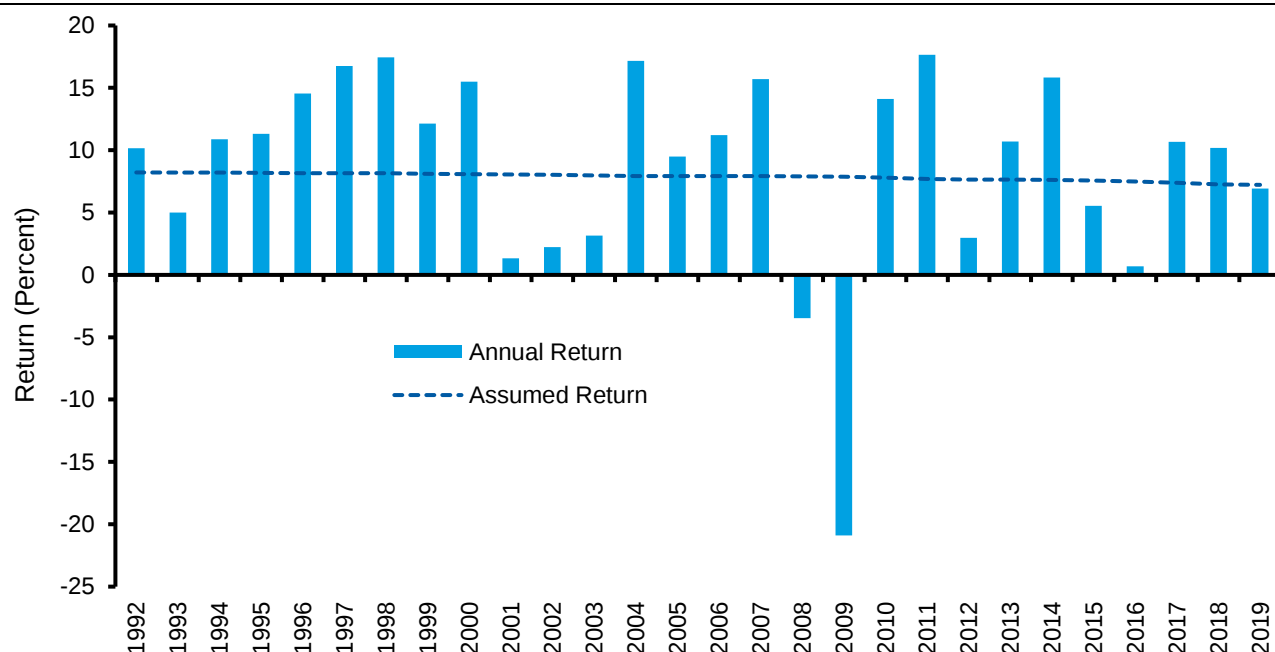


Source: CalPERS; Board of Governors of the Federal Reserve System (U.S.); and FactSet.

Note: Assumed returns and Treasury yields reflect CalPERS's June 30 fiscal year.

Exhibit 10 shows assumed and actual annual returns for a large majority of U.S. state and local government pension plans over nearly 30 years. During this period, the assumed return was 7.9 percent and the actual return was an 8.4 percent compound annual rate. The average assumed rate of return was 7.2 percent in 2019.

Exhibit 10: Assumed and Actual Return for State and Local Government Pensions, 1992-2019



Source: Public Plans Database.

Note: Defined benefit plans; Year-end AUM; Asset-weighted.

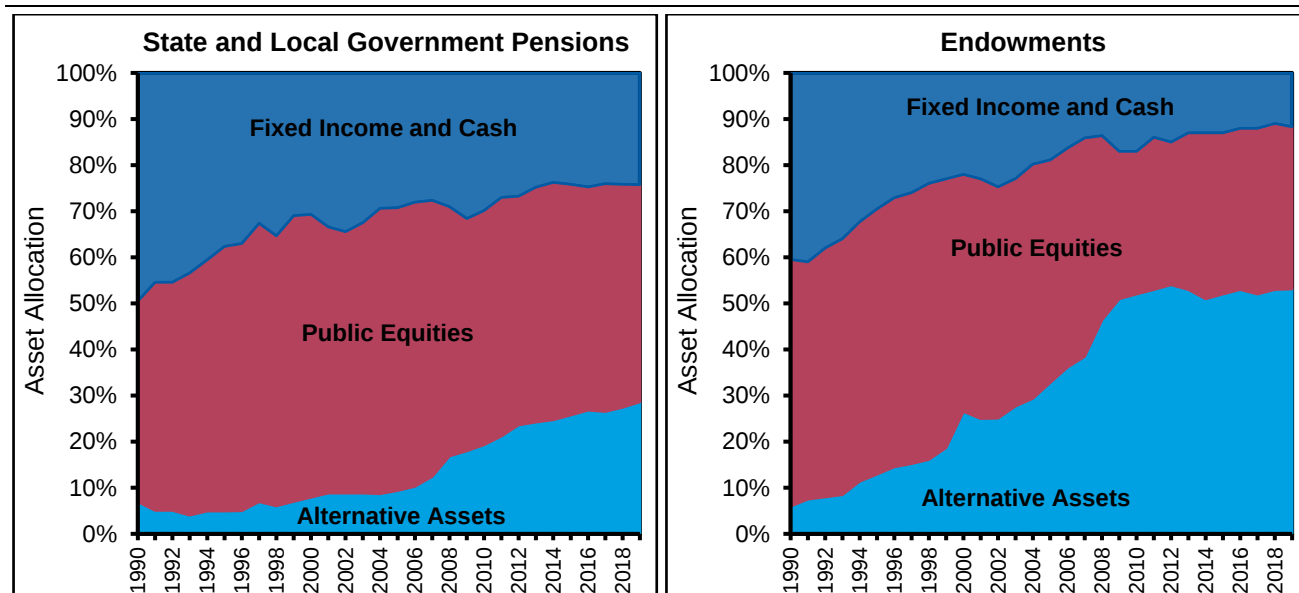
The largest college endowments in the U.S. face the same challenge of earning sufficient returns. The payout from the endowment provides 30 percent or more of the operating revenues for a number of leading institutions.²⁷ For example, Yale's endowment funded 10 percent of the operating budget in 1985 and contributes 35 percent today.²⁸

The vast majority of endowments have a spending guideline, and most use a moving average rule that sets the payout at a pre-specified percentage of average assets over a number of years.²⁹ Many endowments have assumed that a payout figure of five percent is sustainable.³⁰

The endowments must try to meet the needs of their institutions in the face of lower expected returns. One way to do this is to assume more risk, and a higher asset allocation to private equity is one attempt to solve the problem. Buyout funds, as well as hedge funds, are also an indirect way to lever returns.

The pattern in asset allocation that we have seen is consistent with the search for returns. The left panel of exhibit 11 shows that a large sample of state and local government pension funds in the U.S., with total assets estimated to be \$4.5 trillion, have increased their allocation to alternative assets from 7 percent in 1990 to 29 percent in 2019.³¹ Close to 40 percent of surveyed institutional investors plan to increase their exposure to alternative assets.³²

The right panel of exhibit 11 shows that university endowments, which collectively control assets of more than \$600 billion, have undergone an even bigger shift. Endowments increased their allocation to alternative assets from 6 percent in 1990 to 53 percent in 2019. While smaller endowments have less exposure to alternative assets than larger ones do, the trend is consistent.³³

Exhibit 11: U.S. Pensions and Endowments Move to Alternative Assets, 1990-2019

Source: Public Plans Database; Ronald J. Ryan and Frank J. Fabozzi, "The Pension Crisis Revealed," Journal of Investing, Fall 2003, 43-48; National Association of College and University Business Officers (NACUBO); and "Stephen G. Dimmock, Neng Wang, and Jinqiang, Yang, "The Endowment Model and Modern Portfolio Theory," Working Paper, April 23, 2018.

Note: Asset-weighted.

David Swensen led Yale University to embrace the "endowment model," including a large allocation to illiquid assets, and is credited with generating \$20 billion in excess returns for the university's endowment.³⁴ Yale's success has spawned a lot of imitators, but the problem is that not all funds can be Yale.

There are two reasons that alternative assets appear to be attractive. First, they can offer high returns. This is based on two premises. One is that limited partners (investors) can identify skillful general partners (fund managers) who have the ability to deliver attractive results. The other is that there is a return premium for owning illiquid assets. Second, alternative assets can improve the profile of a portfolio if the returns have a low correlation with the other assets in the portfolio. In other words, alternatives can provide diversification benefits.

Return dispersion, the difference between the best and worst funds, is very wide in private equity relative to other asset classes. Venture capital dispersion is higher than that of buyouts, but both are high. That means the ability to identify and gain access to skillful general partners is crucial. Research shows that skill in fund selection is a significant determinant of returns and that access to the best managers was key to the success of endowments such as Stanford and MIT. The leaders have done better than the followers.³⁵

Liquidity measures the ability to turn an asset into cash or cash into an asset. High liquidity means the cost is small and low liquidity means the cost is high. As such, investors demand a higher return for owning an asset that is illiquid, or an "illiquidity premium." Financial economists have documented this premium empirically.³⁶

An institution that seeks to harvest the illiquidity premium can run into trouble when it must meet a sudden demand for liquidity. We saw this in 2008-2009. For instance, the Harvard endowment put up for sale almost 40 percent of its private equity portfolio in the midst of the financial crisis.³⁷ Other long-term managers, including the Stanford endowment and CalPERS, found themselves in a similar liquidity crunch.³⁸

Private equity investments appear to contribute to portfolio diversification. The question is how much of that benefit is the consequence of truly uncorrelated returns rather than the smoothing of returns. Investment managers have some discretion in marking the value of the companies in their portfolios, making them seem less volatile than their public-market counterparts.

A number of financial economists who have studied this issue conclude that the economic exposure of private equity funds is similar to that of public markets.³⁹ If true, this analysis suggests that returns are consistent with risk and that the diversification benefits are not as great as generally perceived.⁴⁰

This is where psychology comes into play. Private equity funds do two things that may benefit investor returns.⁴¹ First, the capital is locked up for a period of time, which limits the ability to buy high and sell low. Second, the smoothed returns provide a perception of stability that may offset the tendency to overreact to short-term losses.

Remarkably, the chief investment officer of CalPERS, Yu Ben Meng, cited the delayed and discretionary valuations as a benefit, suggesting they provide a source of “time diversification.”⁴² Private equity may add value by allowing the funds to stick to their investment policies.

If you had to pick the intellectual home of the efficient market hypothesis and the rational economic actor, the University of Chicago would be a reasonable choice. The University of Chicago’s endowment, like many others, increased its weighting in alternative assets prior to the financial crisis. And it had difficulties similar to other funds when the crisis hit.

Andrew Alper, then chairman of the university’s board of trustees and a member of the investment committee, put it bluntly: “We had underestimated the value of liquidity and overestimated our degree of diversification.”⁴³

In a world of rising education costs and greater longevity, investors are seeking higher returns to satisfy their swelling liabilities. Pension funds and endowments have increasingly turned to private equity in an effort to generate the returns they need. While there may be a reasonable debate about whether private equity will outperform public equity, there is little doubt that fixed income investments offer historically low returns. Investors need to cast a wide net in order to build a portfolio that serves its purpose.

Technology. Corporate governance of public companies remains a hot topic with open questions, including the purpose of the corporation, what role shareholders should play (especially with the rise of indexing), performance measurement, and executive pay.⁴⁴ These are worthy debates.

Compared to public companies, private companies held by buyout or venture capital firms have boards that are much smaller, more sophisticated, and have more skin in the game. Buyout and venture capital firms are involved with risky businesses. For buyouts, the risk is from financial leverage. For venture capital, it is from the uncertainty of new businesses. The companies are in different stages of their lifecycle, but both have an exposure to a form of risk.

We now examine three considerations that are relevant for the multi-decade shift from public to private firms, as well as the composition of the firms that remain public.

The first is the rise of intangible assets. Paul Romer, an economist who won the Nobel Prize in Economics in 2018 for his work on endogenous growth theory, poses a basic question: “How can it be that we’re wealthier today than people were 100 years ago?” The underlying quantity of raw materials has not changed over time. The answer is we can now arrange resources in ways that are more valuable than before.

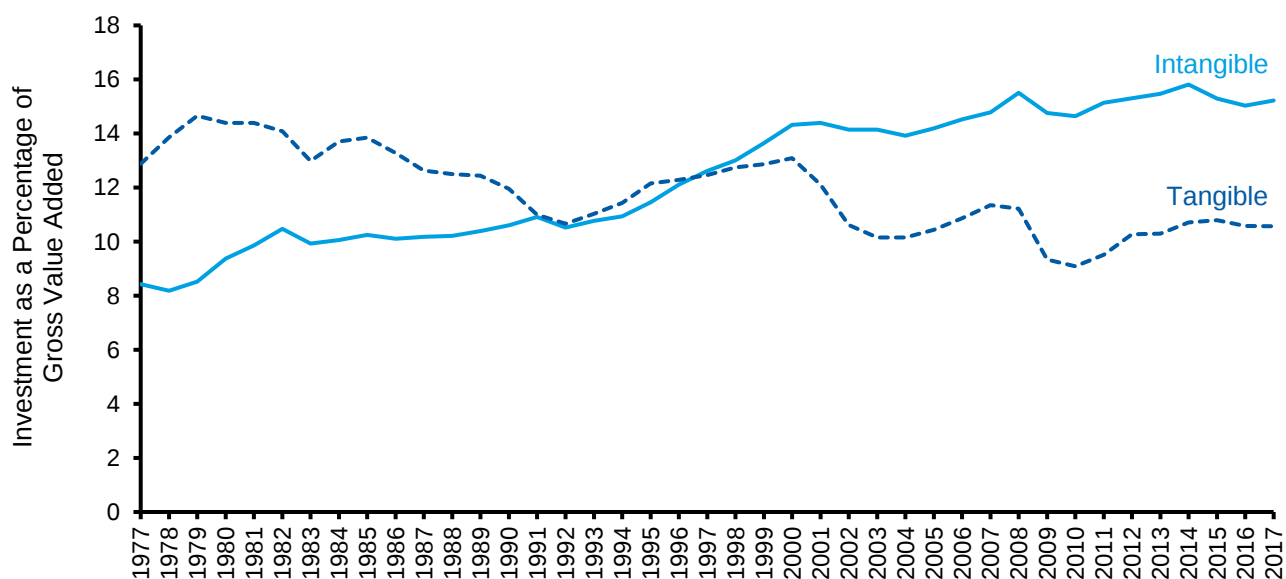
Traditional models of economic growth are based on inputs of capital and labor and treat technology as exogenous. Robert Solow, also a Nobel Laureate, created a model that made technology endogenous. Romer's contribution was to make technology "partially excludable," or a private good.⁴⁵ This allows firms to benefit from their investments.

Romer emphasizes the importance of intangible assets, including instructions, formulas, recipes, and methods of doing things. He argues that "growth takes place when companies and individuals discover and implement these formulas and recipes."⁴⁶

What's important is that these intangible assets have characteristics that are different from physical capital or labor. Economists call them "non-rival" goods, which means that more than one person can use the good at a time. A physical book is a rival good that only one person can read at a time. A digital book is a non-rival good that can be read by many simultaneously. Under certain conditions, intangible-based companies can defy the conventional economic concept of diminishing marginal returns and in fact realize increasing returns.⁴⁷

Exhibit 12 shows how the mix of tangible and intangible investments has changed over the last 40 years. In the late 1970s tangible investments were nearly double those of intangible investments. Today, intangible investments are one-and-a-half times larger than tangible investments. A watershed change in the form of investment has occurred over a couple of generations.

Exhibit 12: The Rise of Intangible Investments in the U.S., 1977-2017



Source: Unpublished update to Corrado and Hulten (2010) using methods and sources developed in Corrado and Hao (2013) and in Corrado et al. (2016) and Corrado et al. (2017) for INTAN-Invest© and the SPINTAN project, respectively. The SPINTAN project was funded by the European Commission FP-7 grant agreement 612774.

Note: Investment as a percentage of gross value added for the business sector.

This shift has a few implications for our discussion. To begin, companies need less capital because they need fewer physical assets.⁴⁸ For example, sales per employee for Facebook, Inc. were nearly double those of Ford Motor Company in 2019. From 1956 to 1976 the number of public companies grew fivefold, as many companies needed to finance "their mass production and mass distribution."⁴⁹ Today, companies simply do not require as much capital as they once did. This, along with freer access to private capital, allows private companies to remain private longer.

Another implication is that the rate of change, which we can measure by longevity, appears to be speeding up. The idea is that if longevity is decreasing, the rate of change is increasing. About 1,500 companies went public during the 1970s, 3,000 in the 1980s, 3,900 in the 1990s, and 2,100 in the 2000s. Companies that had listed before 1970 had a 92 percent probability of surviving the next five years, and those listed in the 2000s had a probability of only 63 percent. The chance of survival has dropped in each successive decade.⁵⁰ The main reason companies delist is that they are acquired. This contributes to the last implication.

In corporate America, the strong are getting stronger. This is giving rise to “superstar” firms.⁵¹ For example, the gap in return on invested capital between a U.S. company in the top 10 percent and the median has risen sharply in recent decades.⁵² Consolidation explains a large part of this. Measures of concentration, such as the Herfindahl-Hirschman Index, have shown a substantial increase for many industries since the mid-1990s. These include industries that rely on tangible assets.⁵³

When the proper conditions are in place, certain businesses exhibit increasing returns, which include very high market shares and economic profits. Increasing returns are pronounced in intangible-based businesses, and there has been a growing gap between the intangible spending of the large firms relative to small ones.⁵⁴

The shift from tangible to intangible assets has had a meaningful effect on the mix between public and private companies. That many young companies have less capital intensity means they don’t need to go public to raise capital. The mix of the companies that are public has shifted to more reliance on intangible investment, which in turn has led to a reduction in longevity. And the economics of information goods, combined with the concentration of traditional industries and the outsourcing of low-value-added activities, means that a handful of leading companies earn much higher economic rents than their competitors and businesses of the past.

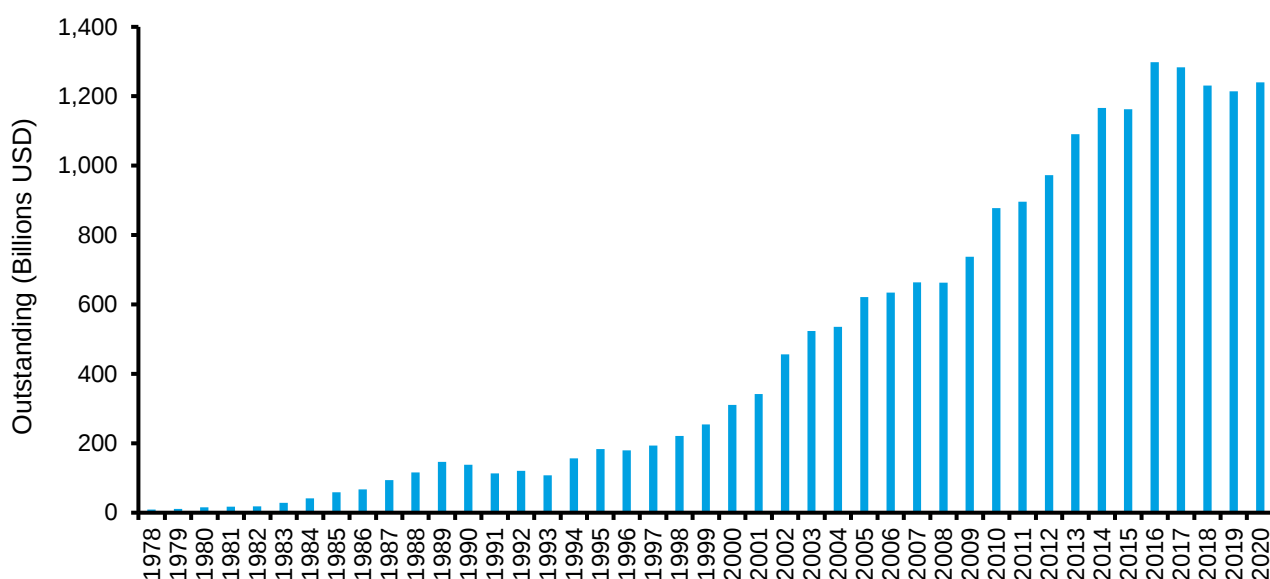
The second consideration is the social and economic backdrop as well as the structure of the financial markets. This has had a large impact on the buyout industry.

In 1989, Michael Jensen, a professor at Harvard Business School, wrote a provocative article called “Eclipse of the Public Corporation.”⁵⁵ Jensen suggested that managers, or agents, were too misaligned with the shareholders, or principals. He argued that corporate structures, such as leveraged buyouts, would effectively deal with the principal-agent problem by aligning managers and shareholders, especially in mature industries where there was a risk of misallocating free cash flow. There were about 5,800 public companies in the U.S. at the time he wrote that paper, and today there are roughly 3,600.

While Jensen’s case seems prescient, there are a few caveats. One is that the capacity and time horizon of the buyout industry is limited by structure. Another is that public companies can take steps to allocate capital more judiciously and align the incentives of managers and owners. Finally, Jensen’s concept works better with businesses based on tangible assets than it does with those built on intangible assets. Despite these limitations, Jensen’s argument set the stage for the buyout industry by identifying the weaknesses of public companies.⁵⁶

Another driver of the buyout industry was the development of the high yield bond market in the 1980s and 1990s and the leveraged loan market since the turn of the 21st century. Debt outstanding in the high-yield bond market was \$24 billion in 1977 and grew to more than \$200 billion in 1990, or from 4 to 25 percent of all corporate debt. In particular, the high-yield market nearly doubled from 1986 to 1989, reflecting the late 1980s buyout wave and the peak prominence of Drexel Burnham Lambert, the largest dealer in the business.

The high yield market retreated in the early 1990s after the demise of Drexel and the savings and loan crisis, only to resume growth in the mid-1990s. Access to this debt financing was vital to the buyout industry in the 1980s and 1990s. The high yield market grew steadily through 2007, even as buyout volume surged. The financial crisis briefly halted growth, but the size again increased until hitting a plateau in 2016 (see exhibit 13).

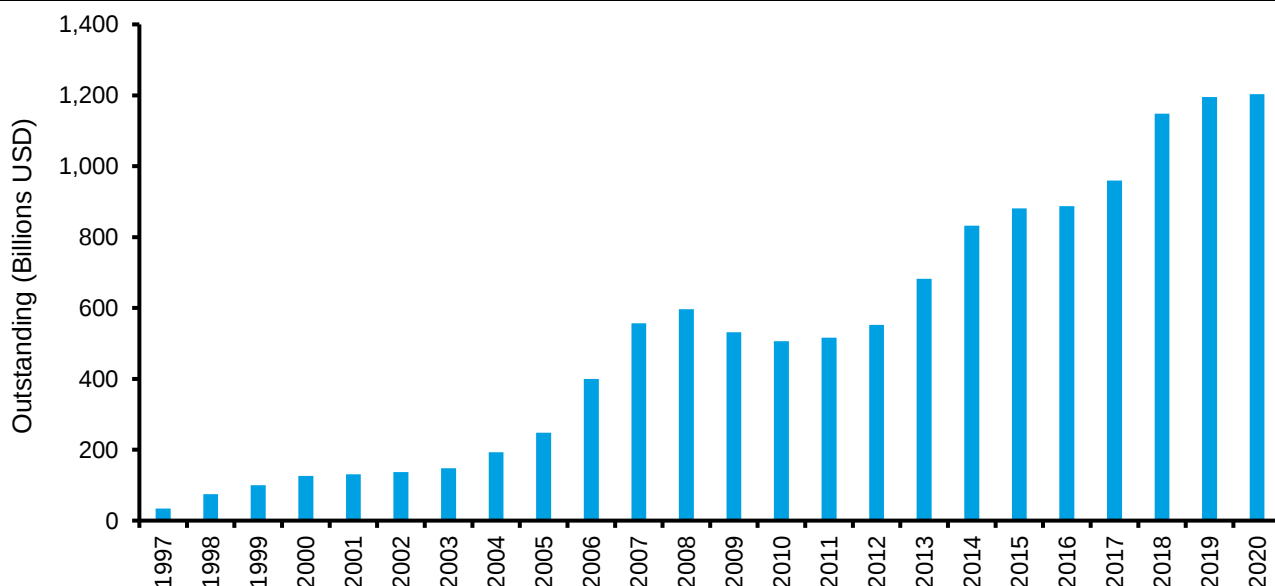
Exhibit 13: U.S. High Yield Bond Market, 1978-2020

Source: Edward I. Altman, "Revisiting the High-Yield Bond Market," *Financial Management*, Vol. 21, No. 2, Summer 1992, 78-92 and Eric Yu, "HY Credit Chartbook," BofA Global Research, April 2, 2020.

Note: Principal amount; through March 31, 2020.

The dollar value of completed buyout deals from 2004-2007, \$535 billion, was 10 times the volume of the prior decade.⁵⁷ Leveraged loans filled the financing void (see exhibit 14). Leveraged loans are bank loans that have credit ratings that are below investment grade.

The leveraged loan market was one-sixth the size of the high yield market in 2000 but grew rapidly, in large part as the result of buyout deals. By 2019, the leveraged loan market, at \$1.2 trillion, was as large as the high yield market. Leveraged loans have represented about one-half of the total sources of buyout financing.

Exhibit 14: U.S. Leveraged Loan Market, 1997-2020

Source: Eric Yu, "HY Credit Chartbook," BofA Global Research, April 2, 2020.

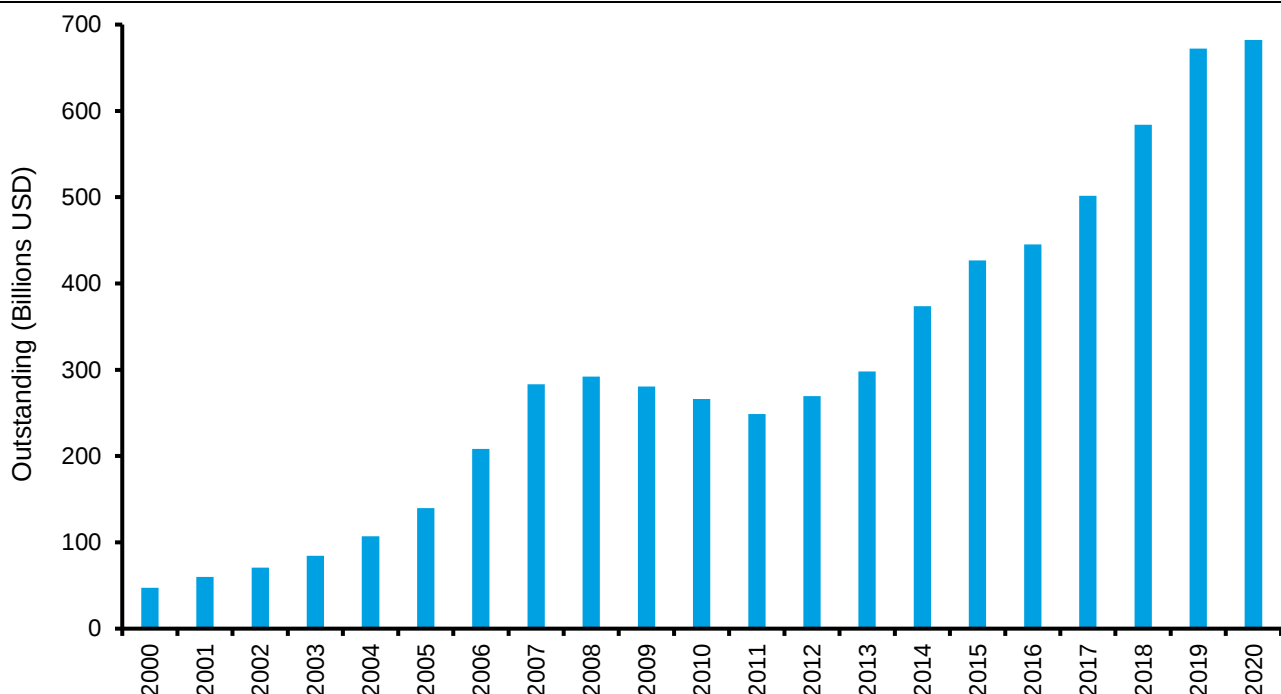
Note: Principal amount; through March 31, 2020.

Key to this discussion is the emerging complementarity between the buyout industry and the leveraged loan market. One central feature in this link is the rapid growth of the market for collateralized debt obligations (CDOs).⁵⁸

Investment banks create CDOs by pooling debt instruments that generate cash and packaging the stream of cash flows into tranches based on different levels of credit risk. For example, the triple-A tranches will receive the cash flows from the pool of debt instruments first, making the securities relatively safe. The equity tranche receives cash flows only after all of the more senior tranches are paid.

Collateralized loan obligations (CLOs), a form of CDO backed by corporate loans, have played an important role in fueling the buyout business. CLOs have gone from 0.1 percent of the leveraged loan market in 1994 to about 60 percent today.⁵⁹ Over that time, CLOs have grown from less than \$1 billion to nearly \$700 billion (see exhibit 15). The primary buyers of leveraged loans include CLOs, insurance companies, and loan, hedge, and high-yield funds. The largest buyers of CLOs are banks, insurance companies, and funds.

Exhibit 15: U.S. Collateralized Loan Obligation Market, 2000-2020



Source: Eric Yu, "HY Credit Chartbook," BofA Global Research, April 2, 2020.

Note: Principal amount; through February 29, 2020.

A few drivers may explain the growth of the leveraged loan market relative to the high-yield market. Leveraged loans tend to be more senior in the capital structure than high yield bonds, are often collateralized, and commonly have floating interest rates. Further, demand has been strong from CLOs.

From the point of view of the issuers, one feature of the leveraged loan market is the opportunity to get terms with less onerous covenants, which are essentially financial metrics that the company must maintain in order to help protect investors. These lenient loans, called "covenant lite," have gone from about 60 percent of the issuance in 2015 to about 80 percent in 2019.

The growth of the leveraged loan market, fueled by supply from the buyout industry and demand from CLOs, has played an important role in enabling the buyout industry.

The bankruptcy code is another factor that has been conducive to the buyout industry in the U.S. A company that is subject to a buyout is roughly 10 times more likely to file for bankruptcy within a decade than a comparable company.⁶⁰ The ability to reorganize the capital structure of the firm is vital because bankruptcy is often the consequence of high financial leverage rather than viability as an ongoing concern.⁶¹

In the U.S., the Bankruptcy Reform Act of 1978 included Chapter 11, a provision that allows for reorganization versus liquidation.⁶² In the early days of buyouts, many countries did not have an efficient way to reorganize companies, and bankruptcy commonly meant liquidation. This discouraged the levering of corporate balance sheets. In recent decades, most European countries have included provisions for reorganization.⁶³

The structure and interplay between finance and business is often the residue of legal tradition. Buyouts first gained traction in countries where common law prevailed, for example the United States and United Kingdom, and were slow to grow in countries guided by civil law such as France, Germany, and Japan.⁶⁴

The buyout industry in the U.S. grew over the decades as the result of a declining risk premium, a legal system that allowed for failure without existential costs, and innovation in financial markets, including CLOs.

The final consideration, essential for venture capital, is what drives “national innovation capacity” for a country. The professors who developed the framework define national innovative capacity as “the ability of a country to produce and commercialize a flow of innovative technology over the long term.”⁶⁵ There are three main determinants of this capacity.

The first is the strength of a nation’s “common innovation infrastructure.” This reflects the country’s policies on science and technology, means to support basic research and advancements in academia, and the size of the stock of technological know-how. This idea is closely related to endogenous growth theory. This has been a strength of the U.S., especially because of its top-flight universities. That there are strong venture capital traditions in Boston and the San Francisco Bay Area, for example, is not a coincidence as these geographies are homes to elite academic institutions, including Harvard, MIT, Stanford, and the University of California, Berkeley.⁶⁶

The next is the “innovation environments” in a nation’s industrial clusters. Michael Porter, a professor of business economics and one of the authors of the work on national innovation capacity, wrote about the factors that support these environments in his book, *The Competitive Advantage of Nations*.⁶⁷ These include the availability of high-quality scientists and engineers who are specialized, a competitive environment that is intense and rewards success, strong and exacting domestic demand for the goods and services produced, and the connection between related industries so as to capture knowledge spillovers.

The final determinant of national innovation capacity is the quality of the link between infrastructure and clusters. National innovation is effective when the infrastructure generates conceptual building blocks and ideas and clusters effectively commercialize products and services. Venture capital plays a vital role in financing innovation, including openness to failure without stigma.⁶⁸

The U.S. has consistently ranked among the top of all nations in innovative capacity.⁶⁹ The venture capital industry has both benefitted from this capacity and been a vital contributor to it.

Legislation. There have been a number of key regulations that have had a meaningful impact on the public market for equities in the U.S. These include rules that protected investors and promoted industry growth. Major legislation that looked out for investors includes the Securities Exchange Act of 1934, which established the Securities and Exchange Commission (SEC), and the Investment Company Act of 1940. The SEC's goal is to protect investors, and the 1940 Act addressed past abuses and specified rules for the investment industry.

Legislation that spurred the industry included the Employee Retirement Income Security Act of 1974 (ERISA), which sharply increased the allowable contributions into retirement plans. It also permitted investments in mutual funds for plans that had been previously prohibited from doing so and established individual retirement accounts (IRAs) for workers not covered by their employer's plan.

ERISA also established what has become known as the "prudent person rule," the principle that a fund's assets should be managed with the care and conservatism of a prudent person. But because the rule did not have a clear definition, many pension fund managers of institutional capital stuck to public and liquid investments.

Legislation has also played a meaningful role in the development of the buyout and venture capital industries. Exhibit 16 highlights some of the most important changes based on legislation from over the past 60 years. Most of these legislative acts reduced the friction for investors to allocate capital to private equity. The most significant of these include the following:

- The Small Business Investment Act of 1958 allowed for the creation of small business investment companies that were licensed and regulated with the explicit intent of funding new and early-stage businesses.
- The guidelines for the prudent man rule were clarified in 1979. These included the idea that a manager could consider diversification as part of an assessment of prudence. As a consequence, private and illiquid investments were suddenly acceptable. That elucidation "flung the door open for corporate pension funds to invest in private capital."⁷⁰
- Cuts in the capital gains tax rate enacted through the 1978 Revenue Act and the Economic Recovery Tax Act of 1981 were associated with an increase in investor commitments to venture capital.
- The relaxing of certain securities laws, most notably through the National Securities Markets Improvement Act of 1996, allowed late-stage private startups to access a greater supply of private capital that enabled them to reach a size that was rare before that capital was available.⁷¹
- The Pension Protection Act of 2006 relaxed a limit ERISA imposed on private funds that said that benefit plans could not make up more than 25 percent of assets. The new law expanded the types of investors that do not count against the total.
- In a June 2020 information letter, the Department of Labor said defined contribution plans can offer private equity as an investment option while remaining in compliance with ERISA. Defined benefit plans have long invested in private equity, but defined contribution plans have avoided it largely due to fears of litigation.

We now turn to the background and major developments in U.S. public equity markets, the buyout industry, and the venture capital industry. We start with public equities.

Exhibit 16: U.S. Legislation and the Impact on Buyouts and Venture Capital

Legislation	Buyout	Venture Capital
Small Business Investment Act of 1958		Increased availability of venture capital for small businesses.
Employment Retirement Income Security Act of 1974 (ERISA)	Discouraged plan fiduciary incentives for high-risk investments.	
1978 Revenue Act	Provided capital gains tax incentive for equity investments.	
ERISA's "Prudent Man" Rule changed (1979)	Clarified investment guidelines for pension investors to allow higher risk investments.	
Small Business Investment Incentive Act (1980)		Redefined venture firms as business development companies, eliminating the need to register as an investment advisor.
ERISA's "Safe Harbor" Regulation (1980)		Stated that venture managers would not be considered fiduciaries of plan assets.
Economic Recovery Tax Act of 1981	Lowered capital gains rate.	
Regulation D (1982)		Provided an exemption from full registration with the SEC to companies raising capital through a private placement, when a company sells equity or debt securities privately to investors.
Tax Reform Act of 1986		Cut incentive for long-term capital gains.
Rule 144A (1990)	Allowed the resale of private securities to qualified institutional buyers.	
National Securities Markets Improvement Act (NSMIA) of 1996		Made it easier for private startups and venture firms to raise capital by: 1) exempting private firms from complying with certain state securities regulations, and 2) allowing venture firms to raise capital from a larger number of investors before having to register under the Investment Company Act.
Pension Protection Act of 2006	Expanded the types of pension plans that can invest in a private equity fund without subjecting the fund to the restrictions of ERISA. Many private funds avoid having to comply with ERISA by limiting investments by benefit plans to 25 percent of the fund's equity interests. The law allows investments from governmental, non-U.S., and certain church plans to no longer count toward the 25 percent threshold.	
Dodd-Frank Wall Street Reform and Consumer Protection Act (2010)	Narrowed the investor base for private funds by effectively increasing the minimum net worth required for someone to qualify as an accredited investor. It did so by excluding the value of a person's primary residence in the calculation of net worth. Eliminated the private adviser exemption that advisers to buyout funds used to remain unregistered with the SEC or state regulator(s). Advisers to VC funds maintained their exemption from registering with the SEC.	
Small Business Jobs Act of 2010		Provided tax cuts and increased the availability of financing for small businesses.
JOBS Act (2012)		Allowed private funds that sell securities to find more investors and raise more capital by removing some restrictions, while still not having to register with the SEC. Previously, funds could only solicit accredited investors and qualified institutional buyers, but the act permits funds to solicit and advertise to a more general audience provided they only ultimately sell to accredited investors and qualified institutional buyers.

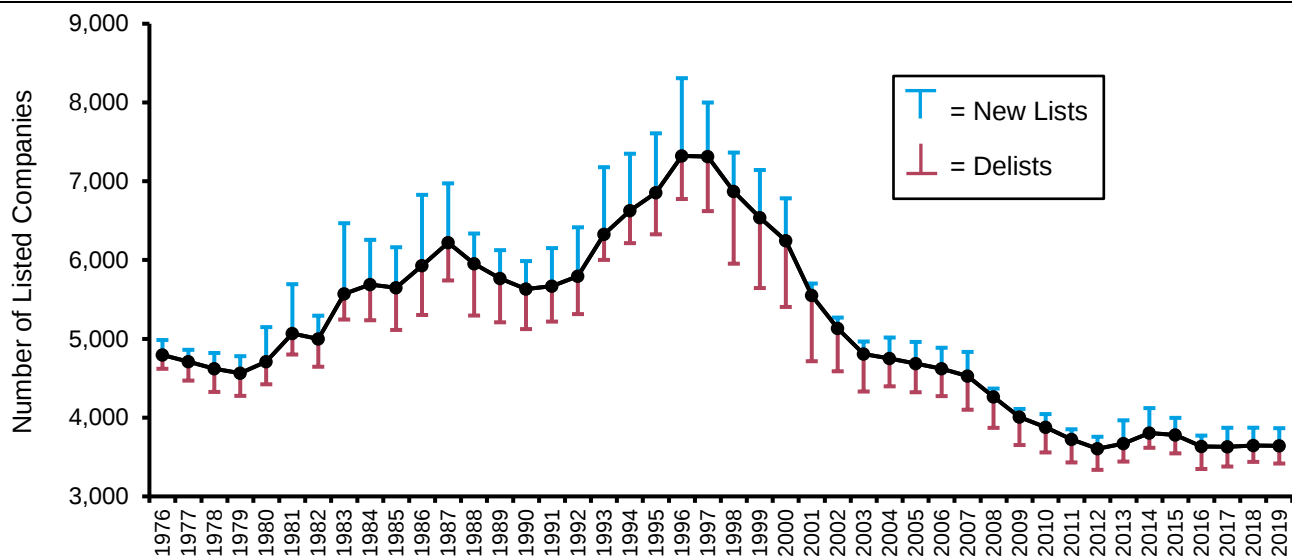
Legislation	Buyout	Venture Capital
Amendment to Rule 504 of Regulation D (2017)		Amended Rule 504 to allow companies to sell \$5 million of securities (up from \$1 million) in a 12-month period.
Tax Cuts and Jobs Act (2017)	Dropped the corporate tax rate to 21 percent from 35 percent but altered the treatment of carried interest and interest expense deductibility: Increased the tax rate on investments held for less than three years (roughly one-quarter of portfolio companies, according to PitchBook) to the short-term capital gains tax rate from the long-term rate; And decreased the amount of deductible interest expense to 30 percent from 100 percent of adjusted taxable income until 2021.	
Information Letter under ERISA (2020)	Defined contribution plans can offer private equity as an investment option.	

Source: William D. Bygrave and Jeffrey A. Timmons, *Venture Capital at the Crossroads* (Boston, MA: Harvard Business School Press, 1992), 24, based on T.A. Soja and J.E. Reyes, *Investment Benchmarks: Venture Capital* (Needham, MA: Venture Economics, Inc. 1990), 202; U.S. Department of Labor; and Counterpoint Global.

Public Equities

The centerpiece of this discussion is the decline in the number of publicly-listed companies in the U.S. since the mid-1990s. Exhibit 17 shows the total number of listed stocks as well as the additions and subtractions each year from 1976-2019. There are one-half as many public companies as there were in 1996 and three-quarters as many as there were in 1976. The Wilshire 5000 Total Market Index, launched in 1974 to reflect the complete U.S. equity market, had 3,473 stocks as of December 31, 2019.⁷²

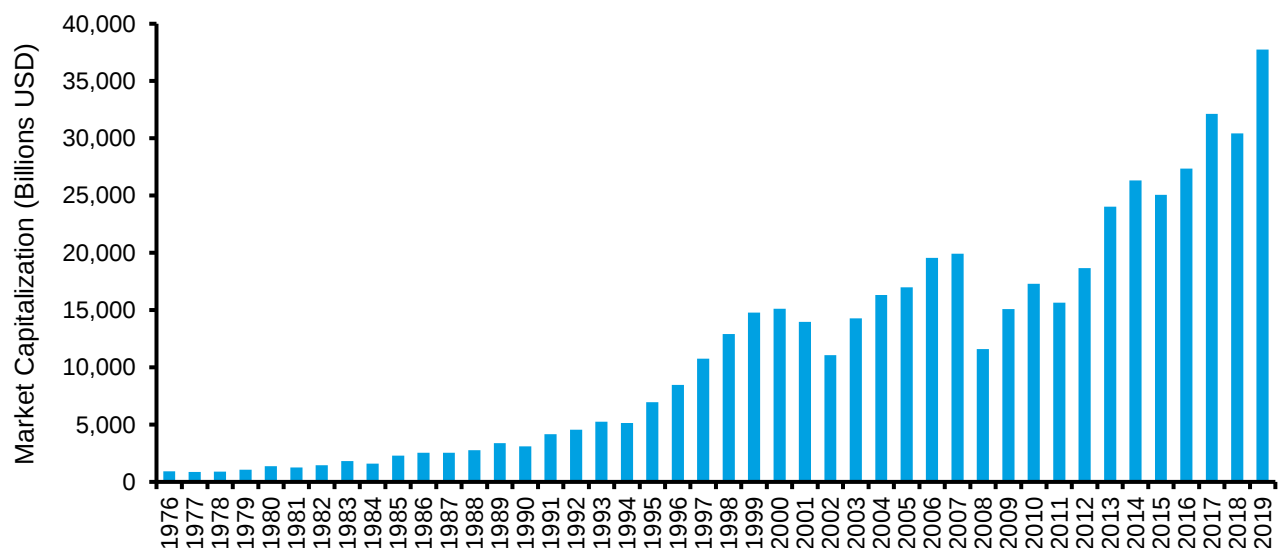
Exhibit 17: Additions and Subtractions to U.S. Listed Companies, 1976-2019



Source: Craig Doidge, G. Andrew Karolyi, and René Stulz, "The U.S. Listing Gap," *Journal of Financial Economics*, Vol. 123, No. 3, March 2017, 464-487; Center for Research in Security Prices; and Counterpoint Global.

The market capitalization of the U.S. stock market has increased significantly since 1976 despite the decline in the number of listed companies (see exhibit 18). The market value of stocks grew at a compound annual rate of 9.0 percent from 1976 to 2019 while the number of stocks shrank at a compound annual rate of 0.6 percent.

Exhibit 18: Market Capitalization of U.S. Public Equities, 1976-2019



Source: World Bank and Center for Research in Security Prices.

The change in the number of public companies over a period is the difference between the number of new listings and delistings. New listings are the result of IPOs, direct listings, and spinoffs. Delistings are the consequence of mergers, voluntary delistings, and removals by an exchange for cause. The number of listed companies has dropped since 1996 even though gross domestic product (GDP) grew 70 percent and population grew 20 percent. Researchers who have built regression models based on GDP, population, and governance suggest that there should be roughly 5,800 to 12,200 more public stocks than there are, a large listing gap.⁷³

Other academics suggest that the number of companies is the wrong way to think about the vibrancy of the stock market or the prospects for economic growth. Rather, they argue that the correct metric is the movement of corporate assets. This requires understanding transactions between companies, including public to public, public to private, and private to public.⁷⁴ For example, if a public company acquires another public company, the nominal listing is cut from two to one, but the real-asset method keeps the count at two. Likewise, the real-asset method counts a public company acquiring a private one as a doubling.

By this reckoning, the reduction in assets since the 1990s is less than five percent, putting to rest concerns about the competitiveness and completeness of the U.S. equity market. Public companies buying one another creates the sense of reduction even as the assets remain in the public sphere. And a public company acquiring a private one puts those assets in the public markets, just not via an IPO.

Three economists, Craig Doidge, Andrew Karolyi, and René Stulz, have done the most-cited work on the listing gap. They seek to explain the number of listed companies as the product of the propensity to list and the population of firms that are candidates for listing.⁷⁵ Their research suggests that there have been changes with both the propensity and the population.

We can distill the propensity to list into an analysis of cost and benefit. The cost of listing includes fees for listing on an exchange, regulatory requirements, expenses related to mandatory disclosure, the competitive risk of revealing information useful for competitors, and investor relations. In addition, executives may feel the burden of delivering short-term results, having a higher profile in the media, and subjecting themselves to the scrutiny and potential action of activist investors. Many of these costs are fixed and have been on the rise.

The benefits of listing are the ability to raise funds for internal uses or acquisitions, liquidity, proper price discovery, and analyst coverage. Netting these costs and benefits, Doidge, Karolyi, and Stulz estimate that the propensity to list is roughly one-half of what it was in the mid-1990s.⁷⁶

Economists who have studied the decline in the number of listed companies have also converged toward the view that the required size to list has risen in recent decades. Part of the reason is the increase in fixed costs associated with listing. Notably, seemingly obvious culprits, such as the Sarbanes-Oxley Act of 2002, which set or expanded disclosure requirements for the boards, management, and accounting firms of public companies in the U.S., did not appear to play a central role in these growing costs.

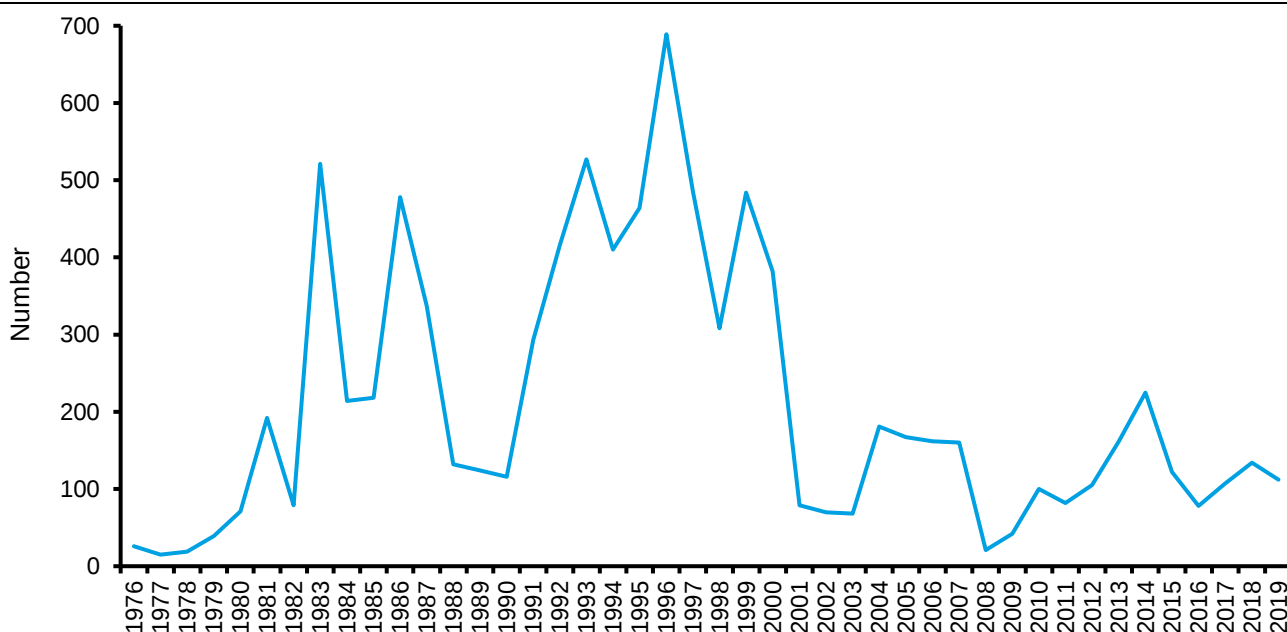
One important driver is the “small size trap,” which states that it is now harder for small companies to become large. For example, in the 1990s somewhere between 15 and 20 percent of small companies became medium or large companies each year. That percentage is now one-half of what it used to be. This in turn reflects a profitability gap. The difference between the median return on assets for large and small companies was 15 percentage points in the 1990s and is now in the range of 30-35 percentage points.⁷⁷

The limited profitability prospects of small companies create the opportunity for economies of scope.⁷⁸ That is, the assets of a small company may be more valuable as part of a big company. So, a small company captures more value by selling to a big company than by doing an IPO and remaining independent as a public company.

This basic sketch, if correct, predicts a reduction in the number of IPOs, an increase in mergers and acquisitions (M&A), and an increase in the average size of a public company. We have seen all three.

Exhibit 19 shows IPOs from 1976 through 2019. There is a general uptrend from the mid-1970s through the mid-1990s, followed by a decline through the present. There were 282 IPOs per year on average from 1976 through 2000 and 115 from 2001 through 2019. Also consistent with the thesis, companies that listed in recent decades are on average older and larger than those of the prior period.

Exhibit 19: Initial Public Offerings (IPOs) in the U.S., 1976-2019



Source: Jay R. Ritter, see <https://site.warrington.ufl.edu/ritter/ipo-data/>.

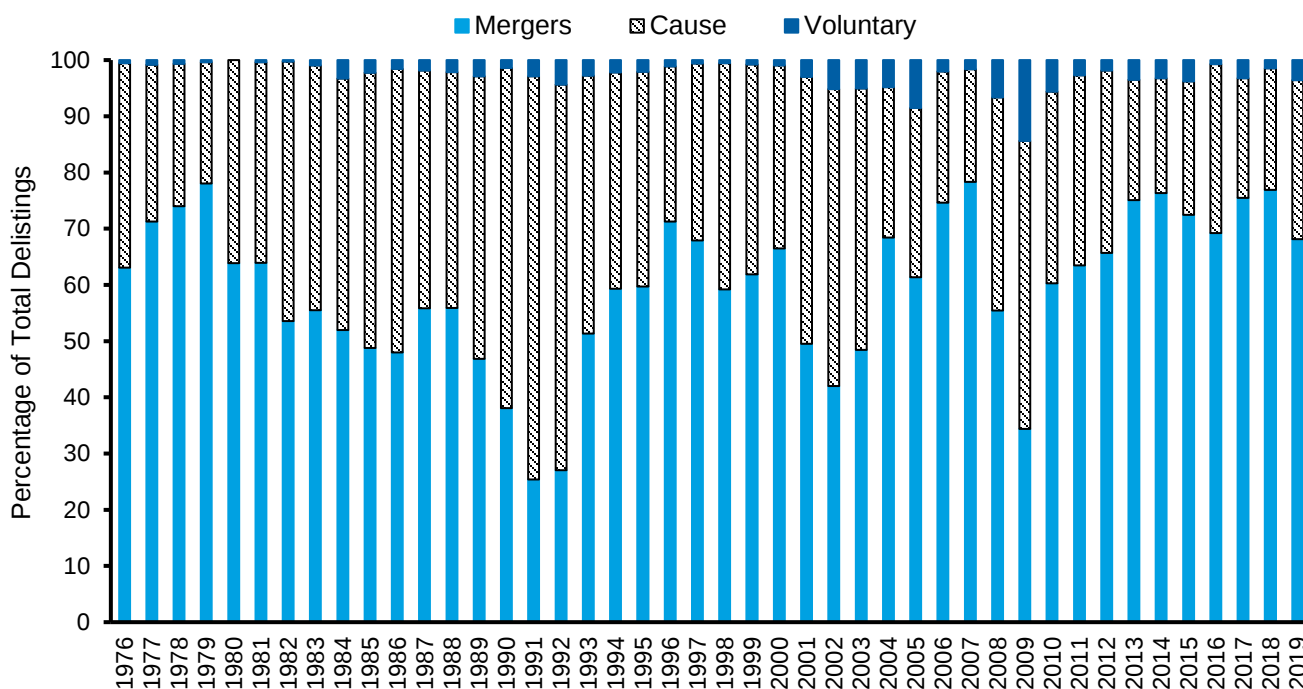
Note: Data for all years exclude SPACs, IPOs with an offer price below \$5.00, ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, and companies not promptly listed on the New York Stock Exchange, the Nasdaq Stock Market, or the American Stock Exchange (currently NYSE MKT); Data for 1980-2019 also exclude IPOs from banks and savings and loans.

Direct listings have garnered a great deal of attention recently. With a direct listing, a company creates no new shares, existing holders offer their shares, and there are no underwriters. Enthusiasts point out that companies can get the benefits of being public without the cost of underwriting and other common frictions such as lockups. For example, IPOs of companies backed by venture capital firms from mid-2009 through mid-2019 saw an average price increase of 21 percent on their first day of trading, suggesting sellers left substantial profits on the table. For now, however, only a tiny percentage of new listings are direct.⁷⁹

Exhibit 20 shows the reasons why stocks of companies are delisted. A voluntary delisting is the least common explanation. This is the case when a company decides the cost of being public outweighs the benefit and is consistent with the thesis that the size threshold of listing has been on the rise. The stocks of some of these companies continue to trade but are not registered with an exchange.

A stock exchange can compel a company to delist for cause. This happens when a company files for bankruptcy or fails to meet certain requirements, such as being current with filings that the Securities and Exchange Commission requires or sustaining a minimum stock price and market capitalization.

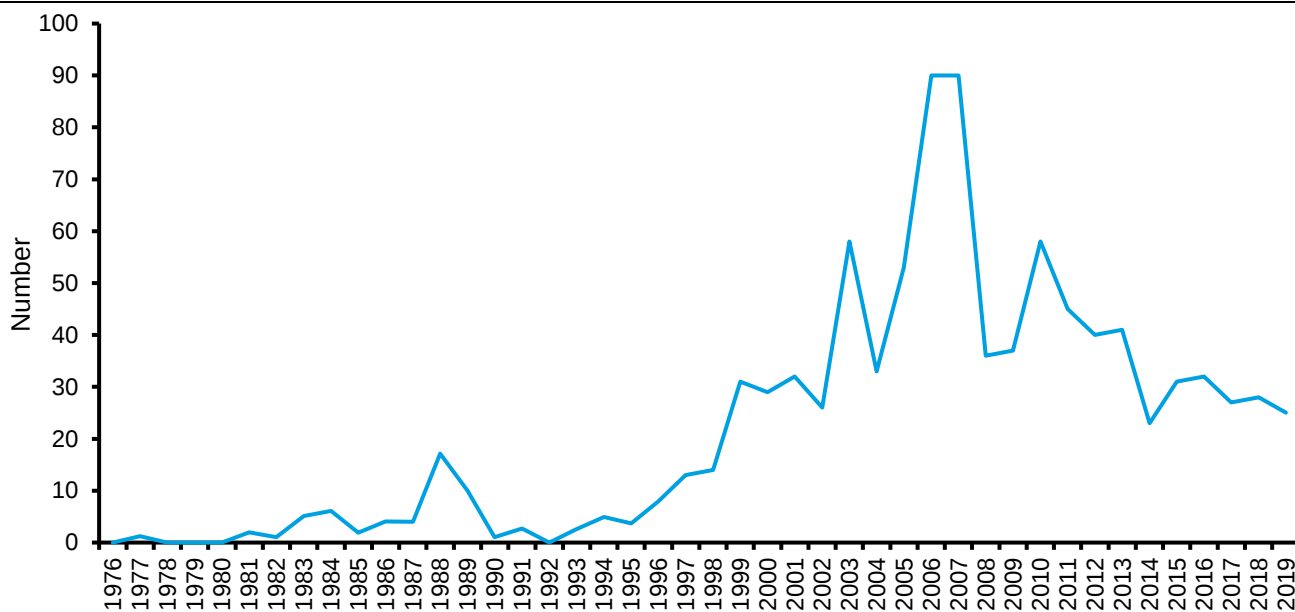
Exhibit 20: Reasons for Delisting, 1976-2019



Source: Doidge, Karolyi, and Stulz, "The U.S. Listing Gap"; Center for Research in Security Prices; Counterpoint Global.

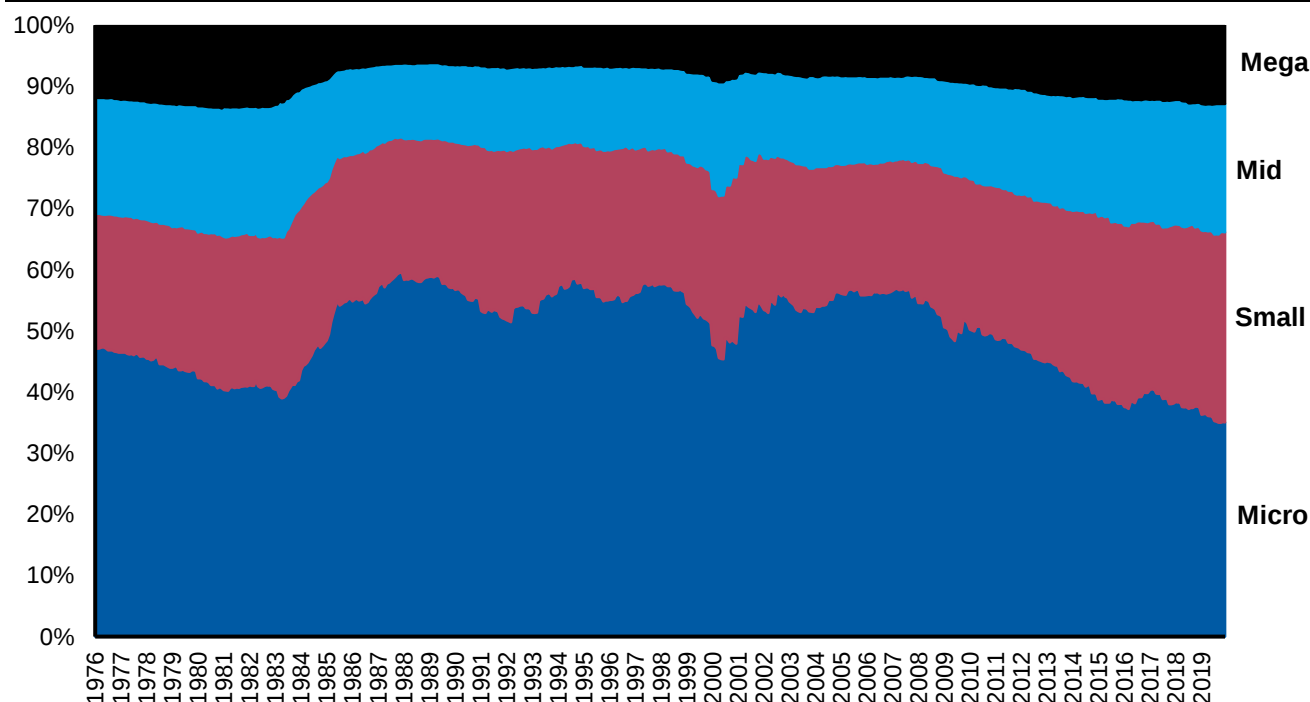
M&A is by far the leading explanation for delisting. For this discussion, the focus is on deals that shrink the number of public companies. These include strategic and financial deals. A strategic deal is when one public company buys another. A financial deal is when a buyout firm acquires a public company. The bulk of delistings are the result of strategic deals.

Exhibit 21 shows the deals done by buyout firms. Since 2000, financial buyers have accounted for about 10 percent of the total delistings associated with M&A. The upswing in strategic and financial M&A from the mid-1990s through the early 2000s explains a large part of the drop in the number of public companies.

Exhibit 21: Delistings as the Result of Buyout Deals, 1976-2019

Source: Alexander Ljungqvist, Lars Persson, and Joacim Tåg, "Private Equity's Unintended Dark Side: On the Economic Consequences of Excessive Delistings," NBER Working Paper 21909, January 2016; FactSet; and Counterpoint Global.

The size threshold thesis also suggests that the companies leaving the public sphere are on average smaller than those that remain. That is true. Exhibit 22 shows the mix of mega-, mid-, small-, and micro-capitalization public companies from 1976 through 2019. While there has been a decline in each size category, more than 90 percent of the stocks that have disappeared since 1996 were those of small- and micro-capitalization companies.

Exhibit 22: Mix of Mega-, Mid-, Small- and Microcap U.S. Public Companies, 1976-2019

Source: Center for Research in Security Prices.

Therefore, the average market capitalization of a public company is much larger today than in the past. For example, the average market capitalization of a public company in 1976, measured in 2019 dollars, was \$686 million. By 1996, that average grew to just under \$1.8 billion. Today, the average market capitalization is nearly \$10.4 billion.⁸⁰ See exhibit 23.

Exhibit 23: Snapshots of the U.S. Investable Universe: 1976, 1996, and 2019

Characteristics of U.S. Stock Market	1976	1996	2019
Number of listed companies	4,796	7,322	3,643
Market capitalization (billions 2019 USD)	\$3,289	\$13,019	\$37,741
Gross domestic product (billions 2019 USD)	\$6,684	\$12,394	\$21,428
Market capitalization as a percent of GDP	49%	105%	176%
Individual direct ownership	50%	27%	22%
Number of exchange-traded funds (U.S. domestic equity)	0	2	921
NYSE annual share volume (in millions)	5,360	104,636	892,265
Equity options traded (contracts in millions)	32	199	4,421
Number of CFA charterholders	3,800	23,500	99,000
Number of CFA charterholders per listed company	1	3	27
Characteristics of U.S. Companies			
Average market capitalization (millions 2019 USD)	\$686	\$1,778	\$10,360
Corporate profit as a percent of GDP	7.3%	6.5%	8.6%
Average age in years of a listed company	11	12	19
Herfindahl-Hirschman Index (HHI)	1,250	960	1,660
AUM of U.S. Investors (in Billions USD)			
Active mutual funds (U.S. domestic equity)	\$39	\$1,356	\$5,615
Index mutual funds (U.S. domestic equity)	<\$1	\$85	\$2,824
Exchange-traded funds (U.S. domestic equity)	\$0	\$2	\$2,584
Hedge funds (long/short equity)	<\$1	\$130	\$973
Venture capital	\$4	\$39	\$456
Buyout funds	<\$1	\$159	\$1,413

Source: Doidge, Karolyi, and Stulz, "The U.S. Listing Gap"; World Bank; Center for Research in Security Prices; U.S. Bureau of Economic Analysis; Kenneth R. French; Board of Governors of the Federal Reserve System; New York Stock Exchange and Yahoo! Finance; CFA Institute and Christopher M. Brockman and Robert Brooks, "The CFA Charter: Adding Value to the Market," Financial Analysts Journal, November/December 1998, 81-85; Options Clearing Corporation; Claudio Loderer, René Stulz, and Urs Waelchli, "Firm Rigidities and the Decline in Growth Opportunities," Management Science, Vol. 63, No. 9, September 2017, 2773-3145; Gustavo Grullon, Yelena Larkin, and Roni Michaely, "Are U.S. Industries Becoming More Concentrated?" Review of Finance, Vol. 23, No. 4, July 2019, 697-743; ICI 2020 Fact Book; Hedge Fund Research; PitchBook; NVCA Yearbook 2010; and Counterpoint Global estimates.

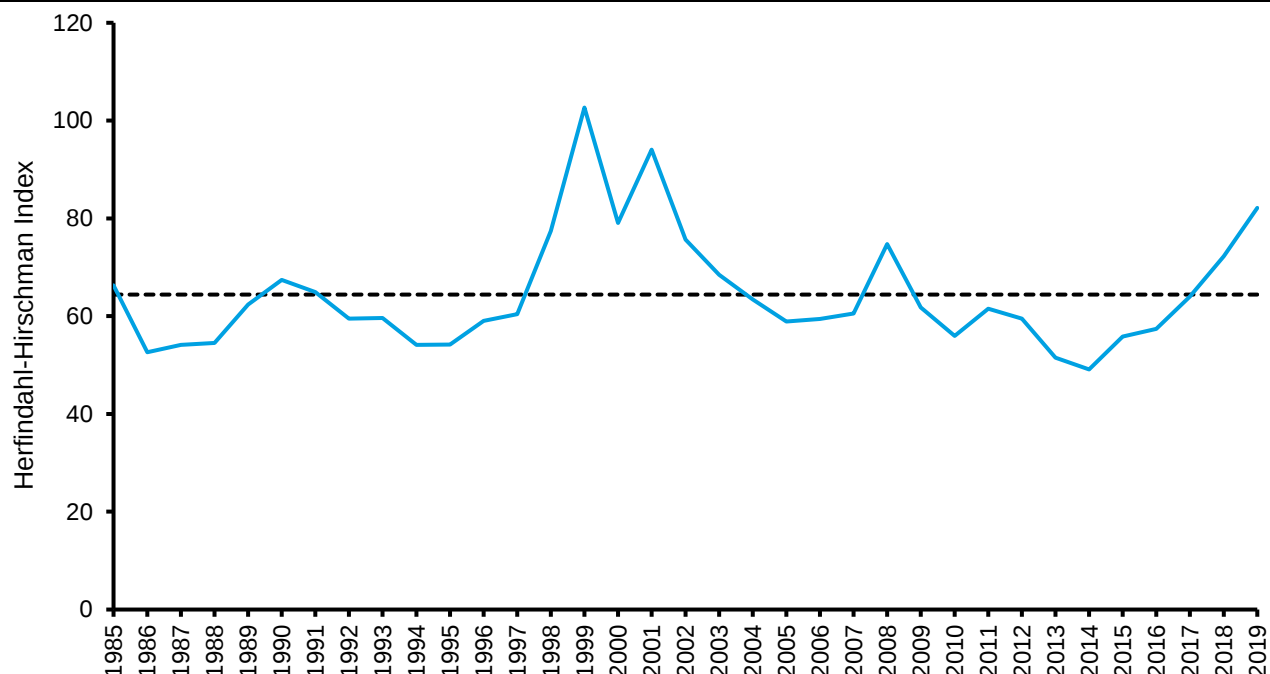
Note: Numbers of CFA charterholders are for the Americas; Latest HHI figure is for 2014.

We can measure the concentration of the stock market using the Herfindahl-Hirschman Index (HHI). You calculate the HHI by squaring each stock's market weighting, or market capitalization divided by the overall market capitalization, adding up the total, and multiplying by 10,000. For instance, the HHI is 2,500 for a stock market with 5 stocks and weightings of 0.35, 0.25, 0.20, 0.15, and 0.05 ($10,000 * [0.35^2 + 0.25^2 + 0.20^2 + 0.15^2 + 0.05^2]$). The higher the HHI, the more concentrated the market.

Exhibit 24 shows the HHI for the Russell 1000 index from 1985 through 2019. An equal-weighted index would have an HHI of 10. Peak concentration came in 1999 during the dot-com boom, a period when average valuation multiples were vastly higher than median multiples as the result of huge valuation skew.

As the number of listed companies declined from the mid-1990s through about 2012, suggesting the market might be getting more concentrated, the HHI generally trended lower indicating less concentration. Only since 2014 has the HHI resumed an upward trend. There is debate about whether the size effect, a factor that reflects the fact that small-capitalization stocks deliver higher returns than the capital asset pricing model indicates, has remained intact as the number of stocks has dropped.⁸¹

Exhibit 24: Herfindahl-Hirschman Index, Russell 1000 Index, 1985-2019



Source: FactSet.

What do these trends mean for public markets today? First, the companies that are public now are on average much larger and older than companies in the past. Vibrant M&A has led to more concentration in most industries, and a handful of very large technology companies have attained strong market positions. As a result of where they are in the industry lifecycle and the profitability they enjoy, listed companies also have a high proclivity to pay out capital.⁸² Following the introduction of a safe harbor provision for buying back stock in 1982, the preferred means to return capital to shareholders has shifted from dividends to share buybacks.

Second, buyout and venture capital funds have not included many Main Street investors. This could change with the Department of Labor's instruction letter, written in 2020, that may allow private equity as an option for defined contribution plans. But the shift from public to private in the past created a negative externality, or cost, that was

borne by investors who lost access to investment opportunities they might have had in a prior generation.⁸³ Some economists argue that the emergence of private markets leads to “cream skimming,” where informed investors with valuable information keep assets away from public markets in order to generate excess returns.⁸⁴

The SEC is also focused on this disparity in access and is considering steps to make private investments more available by expanding the definition of an “accredited investor.” This would increase the number of investors who would qualify to buy startups before they do an IPO.⁸⁵

Finally, there has been a large shift away from actively-managed equity funds to funds that track indexes or are rules-based. According to data from Morningstar, an investment research firm, funds that mimic popular U.S. equity indexes, such as the S&P 500, now have more assets than funds managed by stockpickers.⁸⁶ Actively-managed funds are still larger if you include separately-managed accounts.

Many institutions are satisfied to gain exposure to the risk and reward prospects of public markets at a low cost and to seek excess returns in private markets. While there is good evidence that active managers add value, it has become more difficult to extract excess returns from the market over time.⁸⁷ The shift from active to passive investing and the resulting change in fees mirror this trend.⁸⁸

Buyouts

A leveraged buyout is a transaction where a buyer purchases a company with ample and stable cash flows and finances the deal with a high ratio of debt to equity. The buyer then seeks to improve operations, governance, and monitoring in order to generate cash flow to pay down the debt.⁸⁹ This focus leads to another potential source of excess returns. The goal is to exit at a price that delivers an attractive return on the equity investment.

Origins. Pinpointing the beginning of LBOs as an activity is difficult, but the acquisition of Waterman Steamship Corporation in 1955 by McLean Industries is a good candidate.

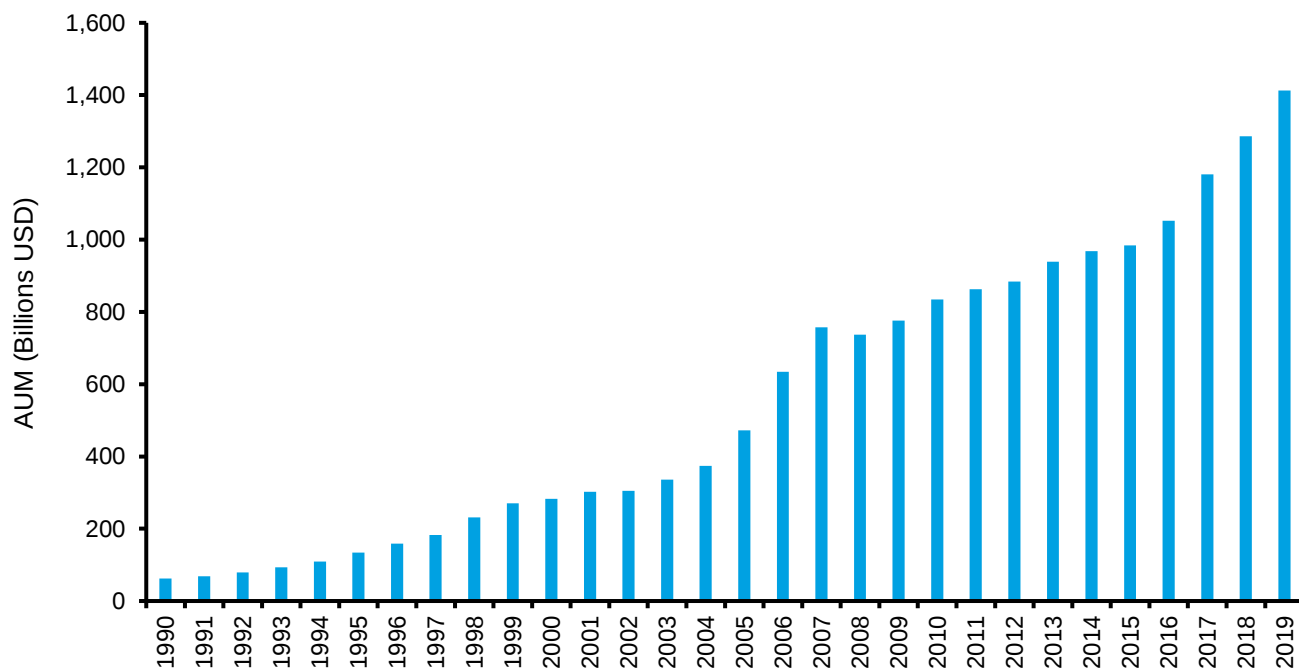
Malcolm McLean was an aggressive businessman who made his fortune in trucking. He gave up his trucking business to get into shipping. Waterman was an attractive target. It had 37 ships, \$20 million in cash, no debt, and a price tag of \$42 million. McLean borrowed that sum from National City Bank, used Waterman's cash to pay off nearly half the loan, and owned the business after having put up only \$10,000 of his own money. Walter Wriston, who would later become chairman and CEO of Citicorp, was the young banker who worked with McLean and said, "In a sense, Waterman was the first LBO."⁹⁰

About a decade later, a group at Bear Stearns, led by Jerome Kohlberg and eventually aided by young colleagues Henry Kravis and George Roberts, started doing "bootstrap deals." These involved buying established companies with predictable cash flows using mostly borrowed money. The first was the acquisition of Stern Metals in 1965 for \$9.5 million, funded with \$8 million in debt. The Stern family put up some equity and continued to run the company.

The success of the LBO business within Bear Stearns led to some internal friction, encouraging the group to leave the firm and start Kohlberg Kravis Roberts & Co. in May 1976.⁹¹ A slew of other firms opened their doors around the same time, including Thomas H. Lee Partners, Forstmann Little & Company, Clayton & Dubilier, and Welsh, Carson, Anderson & Stowe. There are now nearly 1,900 buyout firms in the U.S.⁹²

Industry Structure. We now review the structure of the industry, what the firms are doing, fund performance, and the outlook.

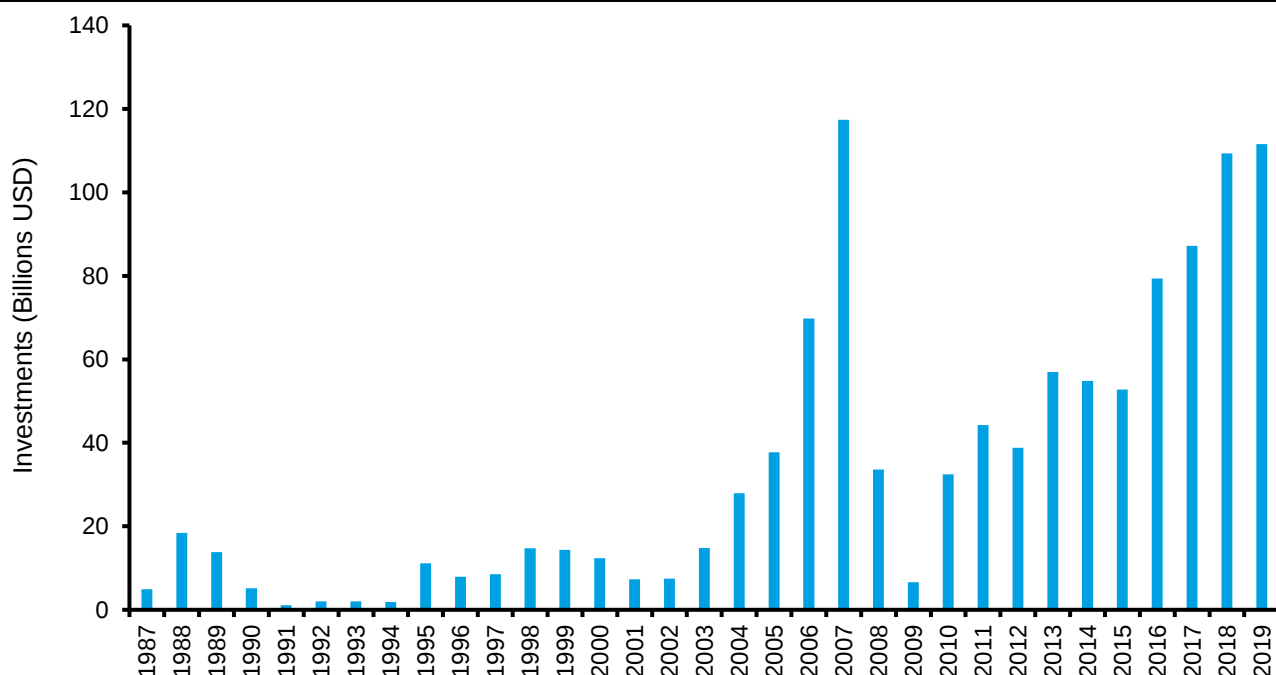
Exhibit 25 shows the AUM for the U.S. buyout industry from 1990 to 2019. Today, AUM is about \$1.4 trillion with dry powder of about \$560 billion. That dry powder represents about \$1.2 trillion in purchasing power assuming a 45 percent equity contribution.

Exhibit 25: Assets Under Management for U.S. Buyout Industry, 1990-2019

Source: PitchBook; NVCA; and Counterpoint Global estimates.

Note: As of September 30, 2019; AUM is dry powder plus remaining value.

Exhibit 26 shows annual investment levels for the buyout funds. Note that the overall deal value is higher because this only reflects the equity contribution. Annual deal investment peaked in 2007.

Exhibit 26: U.S. Buyout Annual Investment, 1987-2019

Source: S&P Global Market Intelligence; Patrick A. Gaughan, Mergers, Acquisitions, and Corporate Restructurings, Seventh Edition (Hoboken, NJ: John Wiley & Sons, 2018), 313; and Counterpoint Global.

Note: Equity contribution.

The typical fee structure for a buyout fund includes a management fee, commonly 1.5 to 2.0 percent of the total amount raised by the fund, and an incentive fee that is most often 20 percent of profits. Only about 10 percent of funds charge less than 20 percent for the profit share, or carried interest, component of fees.

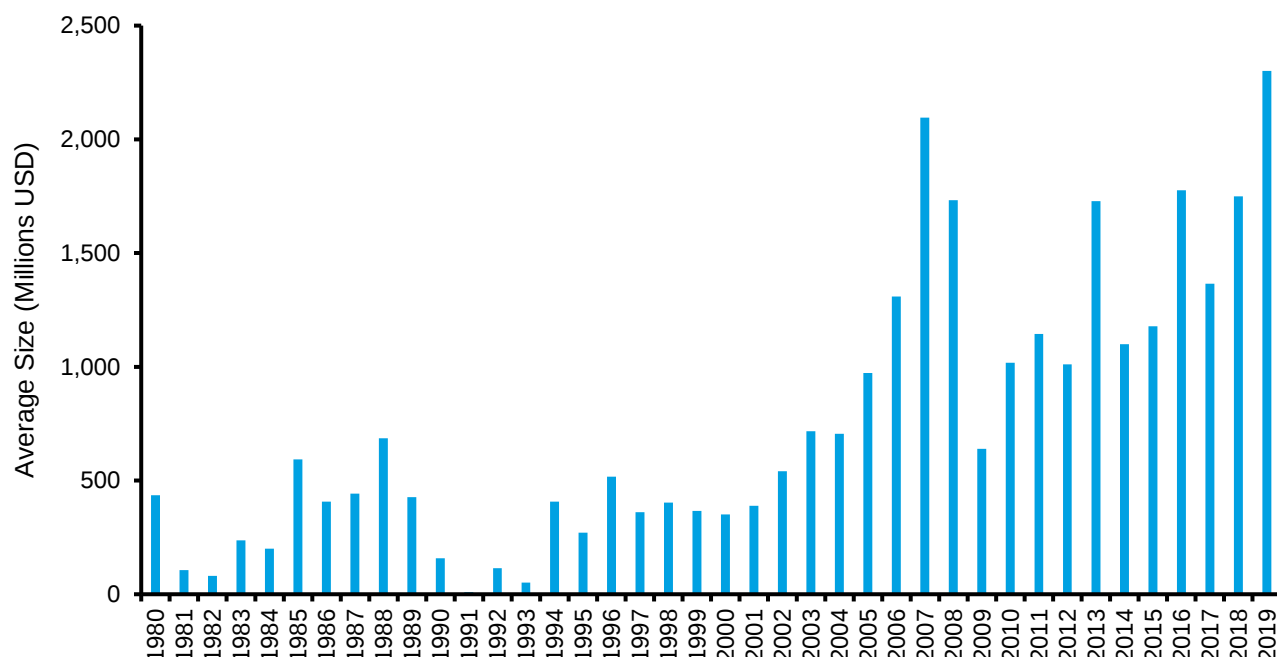
In reality, the effective fees that sophisticated investors pay is less than the headline figures because they have access to co-investments. A co-investment is when a limited partner makes an investment alongside a buyout fund or venture capital firm. The fees on these investments are lower or, in some cases, nonexistent. That said, the sticker price for fees has remained remarkably resilient.⁹³ One study of buyout funds found that management fees are more than one-half of total fees.⁹⁴

Historically, more than 95 percent of buyout deals have been small capitalization, at or below \$1.1 billion in enterprise value, and done at statistically cheap valuations.⁹⁵ These deals would fall into Eugene Fama and Kenneth French's categories of small capitalization and value.⁹⁶ For this reason, small cap value indexes have been a reasonable benchmark for calculating the public market equivalent returns of buyout funds in the past.

But as capital has flowed to the buyout industry, there has been an increase in the size of the deals and the valuation at which the deals are happening based on enterprise value-to-earnings before interest, taxes, depreciation, and amortization (EV/EBITDA). Exhibit 27 shows the average size of deals from 1980 to 2019. Before 2005, deals were consistently in the small capitalization range. That said, one of the most careful studies of the relationship between transaction size and returns found that large deals in the U.S. did as well, if not better, than mid-market deals.⁹⁷

There are high-profile exceptions to the theme of small deals, including KKR's purchase of RJR Nabisco in 1988, but those deals are unusual. Deal sizes increased going into the financial crisis of 2008-2009, with four deals exceeding \$25 billion in 2006 and 2007. Following the financial crisis, deal size has steadily risen.

Exhibit 27: Average Size of U.S. Buyout Deals, 1980-2019

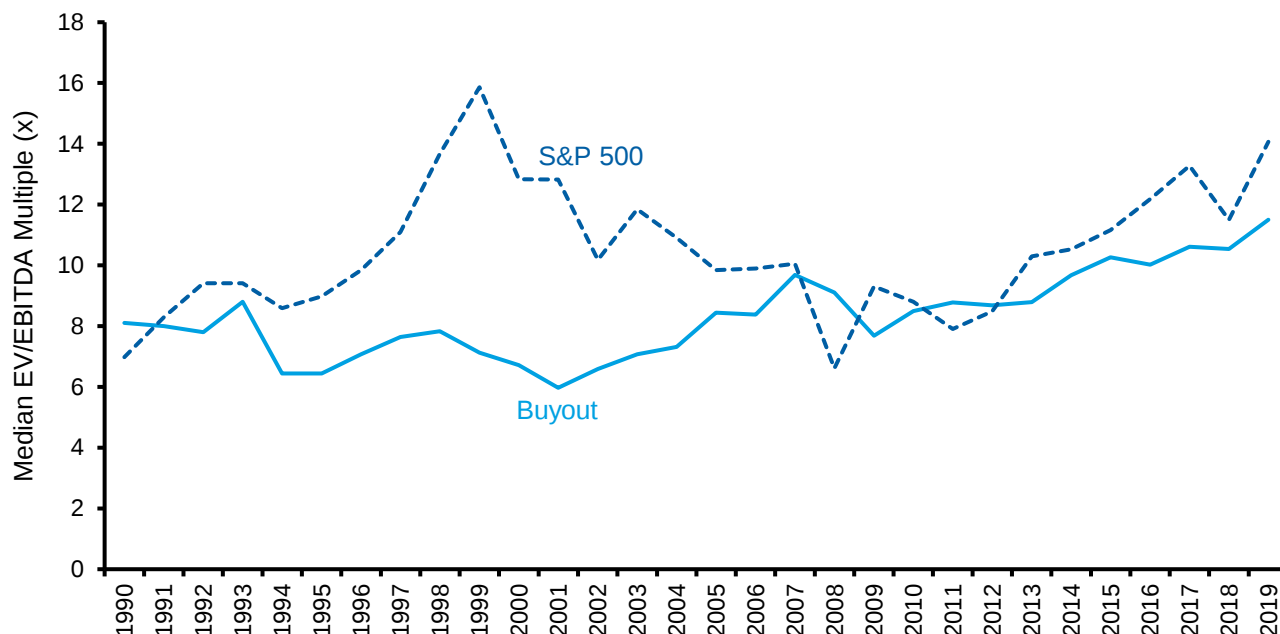


Source: S&P Global Market Intelligence and Evan Kershaw Rose "The Principal Agent Problem, Asymmetric Information and Leveraged Buyouts: How Who Does the Buying Affects Who Gets Bought," Honors Thesis, University of North Carolina at Chapel Hill, April 1, 2011.

The deals are not only bigger, they are pricier. Two points are noteworthy. First, the average multiple has risen steadily since the financial crisis. The EV/EBITDA multiple for 2019, 11.5, was the highest ever recorded, and 55 percent of all deals in the U.S. had a purchase price that was greater than 11 times. Analysis by one buyout firm found more than one-half of the deals it did at an EV/EBITDA multiple in excess of 10 lost money and that in aggregate the high-multiple deals returned only slightly more to investors than what the firm invested.⁹⁸

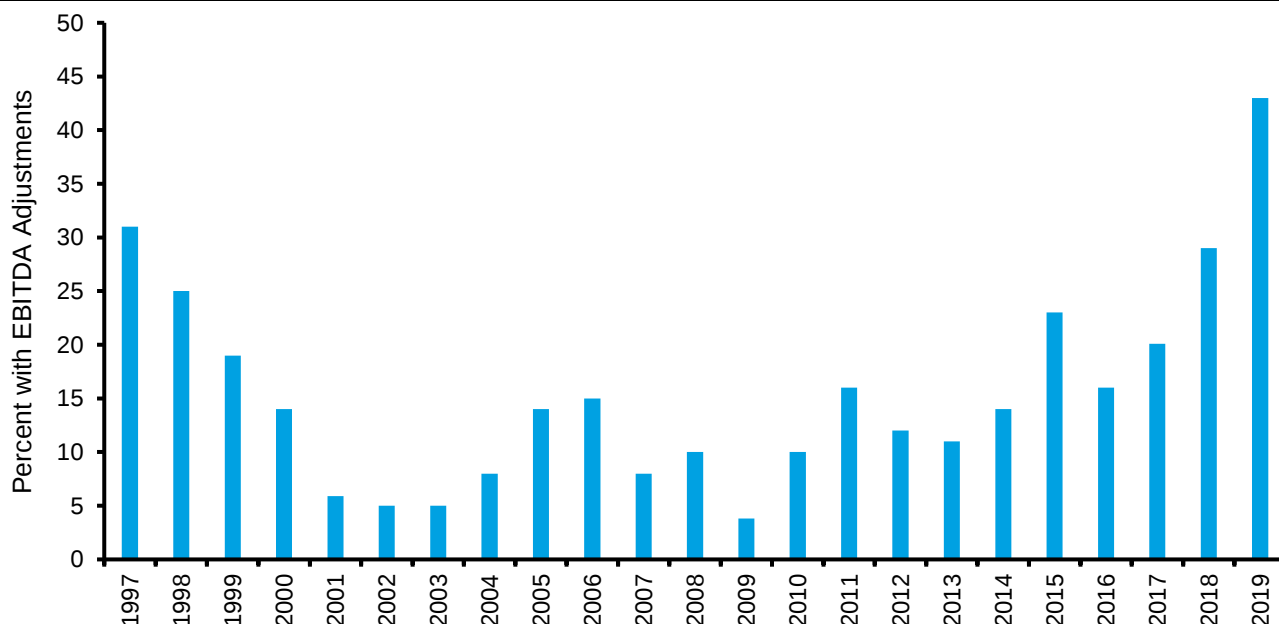
Second, buyout deals had multiples below those of public markets for most of the 1990s and 2000s but have since converged. Exhibit 28 shows the median EV/EBITDA for buyouts and the S&P 500 since 1990. Buyouts have drifted from their roots as transactions focused on small capitalization and value stocks. For example, buyouts of software firms, a sector with above-average multiples, rose from 6 to 17 percent of all deals over the past decade.⁹⁹

Exhibit 28: Median EV/EBITDA for U.S. Buyout Deals and S&P 500, 1990-2019



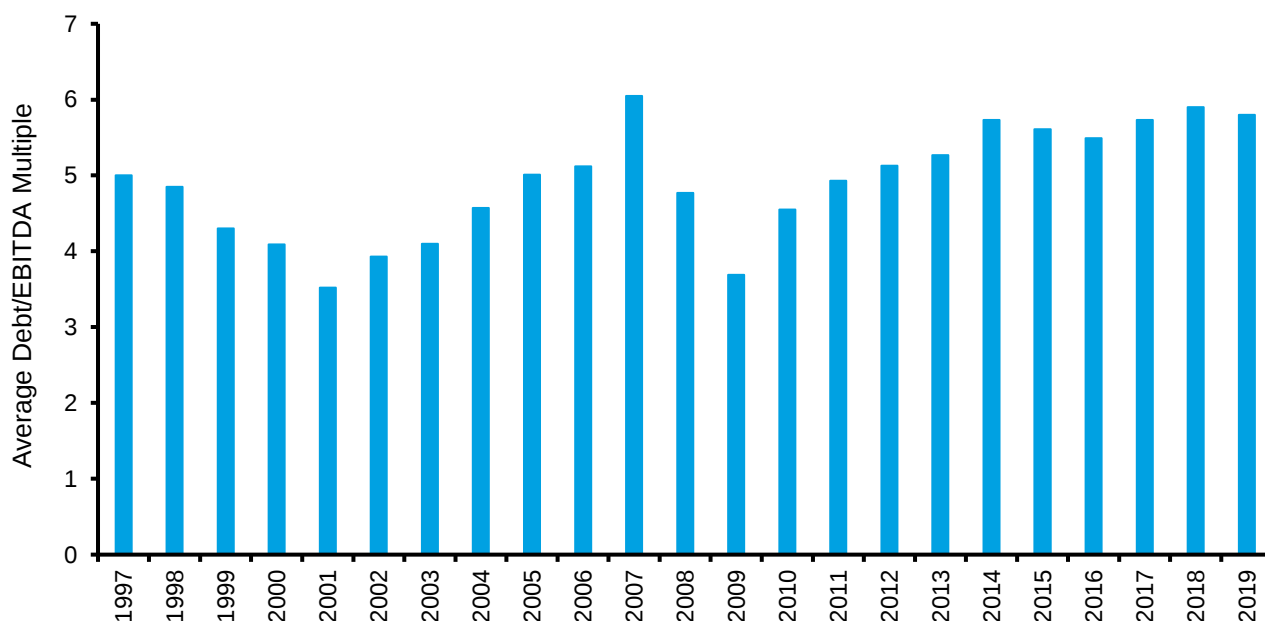
Source: FactSet; S&P Global Market Intelligence; and Ulf Axelson, Tim Jenkinson, Per Strömberg, and Michael S. Weisbach, "Borrow Cheap, Buy High? The Determinants of Leverage and Pricing in Buyouts," *Journal of Finance*, Vol. 68, No. 6, December 2013, 2223-2267.

Further, buyers are increasingly referring to multiples of "adjusted EBITDA," which removes non-recurring items such as restructuring charges and impairment costs and adds items such as acquisition synergies and other anticipated cost savings. Exhibit 29 shows that more than 40 percent of deals now have such adjustments, also the highest on record. Remarkably, companies that provide projections of adjusted EBITDA miss those projections by an average of 35 percent two years after the deal is done.¹⁰⁰

Exhibit 29: Percentage of U.S. Buyouts with EBITDA Adjustments, 1997-2019

Source: Christopher Schelling, "When EBITDA Is Just BS," Institutional Investor, October 11, 2019.

With multiples on the rise, leverage levels, as measured by debt/EBITDA, and equity contributions are also both higher. In 2019, three-quarters of the deals in the U.S. had a leverage ratio higher than six times. Since the financial crisis, one-quarter of the deals had this much leverage on average. Exhibit 30 shows the evolution of leverage levels from 1997 through 2019. Some increase in leverage levels makes sense because lower interest rates reduce the denominator of the interest coverage ratio (EBITDA/interest expense). But higher leverage can present a problem if cash flows fall or interest rates rise.

Exhibit 30: U.S. Buyouts Leverage Levels, 1997-2019

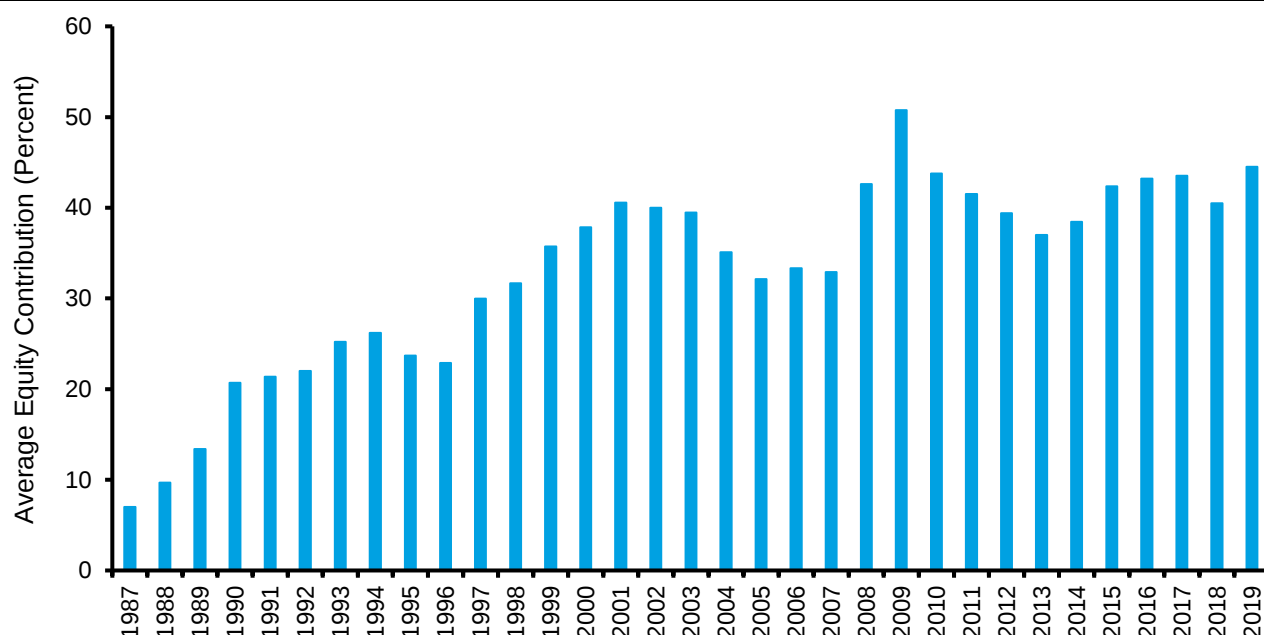
Source: S&P Global Market Intelligence.

Note: Through third quarter of 2019.

Because of the multiples buyout firms are paying, leverage levels and equity contributions are going up at the same time. Think of it this way. Say you have a target company that generates \$200 in EBITDA. Assuming a purchase price of 8 times EV/EBITDA and debt/EBITDA of 6 times, the equity contribution would be 25 percent of the purchase price (\$1,600 purchase price = \$1,200 debt + \$400 equity). The same business and leverage level at a 12 times EV/EBITDA multiple would require 50 percent in equity (\$2,400 purchase price = \$1,200 debt + \$1,200 equity).

Exhibit 31 shows that the average equity contribution to U.S. buyout deals from 1997 to 2019 has ranged from 30-50 percent. High equity contributions make the economics even more reliant on multiple expansion upon exit.

Exhibit 31: Average Equity Contribution to U.S. Buyouts Deals, 1987-2019



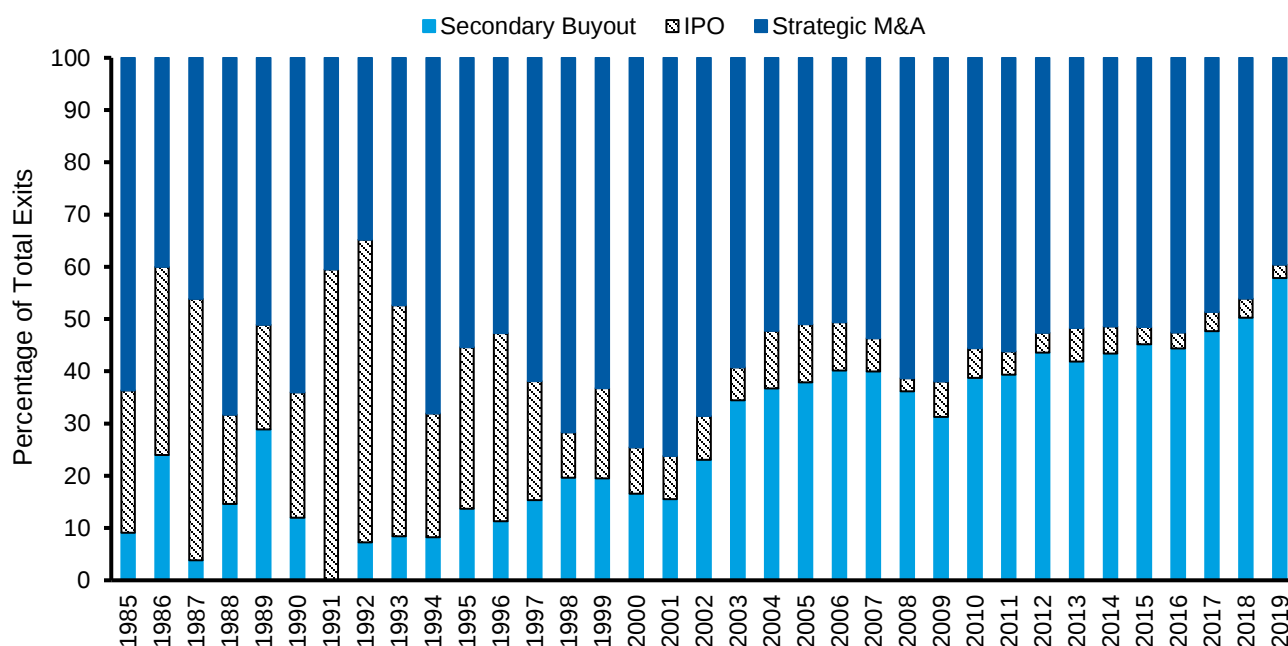
Source: S&P Global Market Intelligence.

Exits. Investment returns ultimately depend on a successful exit. The average holding period was more than 7 years in the 1970s and early 1980s, drifted lower to a trough of 4 years in 2008, and has gradually risen again to about 5.5 years in 2019.¹⁰¹ There is also evidence that some buyout firms add value by timing their entry and exit. Buyout firms have been able to sell businesses at an EV/EBITDA multiple that is consistently higher than the purchase price.¹⁰²

The form of exit has also changed substantially over the decades. In the 1970s and 1980s, a sale to another company, called a “strategic” buyer, represented about 33 percent of exits, and IPOs were another 25 percent. Sales to another buyout or financial firm, called a “financial” buyer, were less than 15 percent of exits. These deals are also called secondary buyouts.

In recent decades, sales to strategic buyers have remained fairly steady. But secondary buyouts, as exhibit 32 shows, have grown significantly as a share of exits and are now a majority. Exits via IPO have dwindled. Since the 1990s, the buyout industry has grown faster than the overall equity market, buyout firms have recycled capital by trading companies among themselves more frequently, and the number of IPOs has shriveled.¹⁰³

Exhibit 32: Evolution of Exits for U.S. Buyouts, 1985-2019



Source: PitchBook.

Persistence measures the relationship between two outcomes of the same activity. For example, a buyout firm's results are persistent if its first and second funds both generate excess returns. Persistence is a good measure of skill because it captures repeated success or failure. There is a large literature on persistence in the investment management industry because it is a potential way to identify skillful managers.¹⁰⁴

There is a general consensus that buyout funds were persistent prior to 2000 but that persistence has declined since then.¹⁰⁵ This is consistent with an industry that has grown and become more competitive. Exhibit 33 shows one analysis of persistence. The rows sort one set of funds in quartiles based on returns, and the columns show the returns for subsequent funds, also by quartile. The left panel is funds before 2001, and the right panel captures funds after 2000.

For example, a fund launched before 2001 that was in the top quartile of returns had a 38 percent chance of remaining in that quartile and a 63 percent chance of being above average. By contrast, a fund launched after 2000 that was in the top quartile of returns had only a 24 percent chance of remaining in that quartile and a 48 percent chance of being above average. If results were random, each cell would be 25 percent.

Exhibit 33: Persistence for Buyout Funds

Pre-2001		Subsequent Fund Quartile				Post-2000		Subsequent Fund Quartile			
Previous Fund Quartile		1	2	3	4	Previous Fund Quartile		1	2	3	4
	1	38%	25%	19%	19%		1	24%	24%	27%	25%
	2	30%	22%	30%	17%		2	23%	28%	29%	20%
	3	21%	25%	32%	21%		3	17%	28%	32%	24%
	4	17%	26%	30%	26%		4	27%	30%	21%	21%

Source: Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, and Rüdiger Stucke, "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds," Darden Business School Working Paper No. 2304808, August 30, 2014, Table 3 and Steve Kaplan, "What Do We Know About Private Equity Performance?" Guest Lecture at Miami Herbert Business School, January 31, 2020.

Other researchers, using different data and methods, find continued evidence of persistence.¹⁰⁶ While there remains some debate about the issue, all agree that fund assessment should include consideration of the opportunity set, manager process, and fund size.

The data also reveal that the dispersion of returns, measured as the difference between the 75th percentile (high) and 25th percentile (low), has been shrinking over time. Measured as points of PME, the difference has gone from about 0.75 in the 1990s to 0.25 today. Tim Jenkinson, a professor of finance at the University of Oxford and one of the leading researchers in the field, said, “Top decile is the new top quartile.”¹⁰⁷

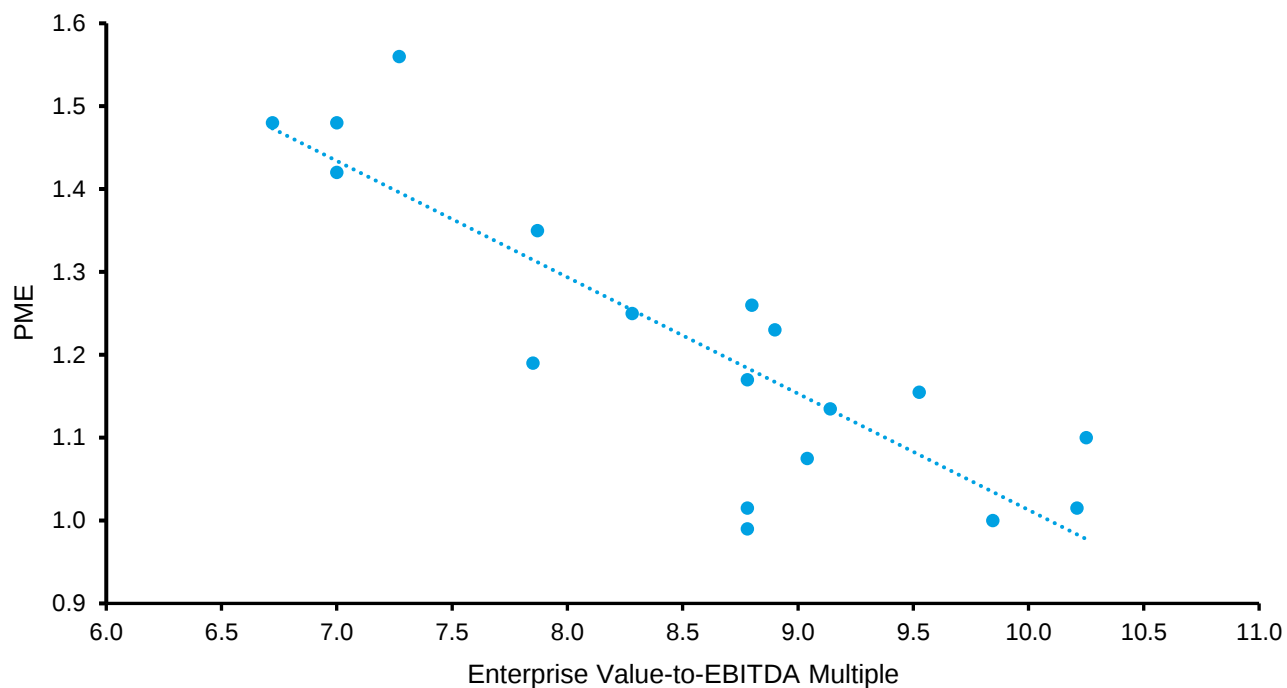
This is an example of what we call the “paradox of skill,” which says that even as absolute skill among competitors increases, relative skill often decreases and the difference between the best and the average shrinks. The paradox of skill is observable in many domains, including sports, business, and investing.¹⁰⁸

Part of the explanation for the paradox of skill is that many more new funds are raised on the record of top quartile funds than bottom quartile funds. So the best increasingly compete against one another and the worst do not participate in subsequent funds. Despite the fact that it has shrunk, return dispersion in buyouts remains higher than lots of other asset classes, including equity mutual funds.

One clear trend in fundraising is that more of the capital is going to fewer firms, which means that limited partners are being more selective and are increasingly investing alongside the bigger buyout firms. For example, in 2019 there was a 14 percent decline in the number of buyout funds raised but an 80 percent increase in fund size.¹⁰⁹ In the U.S. alone, six funds raised more than \$10 billion each in 2019.¹¹⁰

Overall, small funds tend to outperform large funds. One study shows that the larger the current fund is relative to the previous fund, the lower the IRR relative to the first fund. For instance, a new fund that is double the size of the prior fund has an expected IRR that is four percentage points lower. The author does not argue that larger fund size causes the lower returns but rather that the results reflect regression toward the mean.¹¹¹ We would add only that regression to the mean occurs rapidly when luck plays a large role in shaping outcomes.

Outlook. The outlook for returns from U.S. buyouts relies on assumptions about the multiples paid to buy businesses, the amount of leverage used, the potential to improve operations, the multiple received upon exit, and fees.¹¹² The main argument for muted returns in the future is the recent trend in multiples paid. As Exhibit 34 shows, there has historically been a clear correlation between the entry multiple and PME. Low deal multiples are associated with high PMEs and high multiples with low PMEs. Another analysis that considered these trends projects buyout returns to be 300-400 basis points lower going forward compared to the 25 years ended in 2018.

Exhibit 34: Enterprise Value-to-EBITDA Multiples and PME, 1997-2014

Source: Gregory W. Brown and Steven N. Kaplan, "Have Private Equity Returns Really Declined?" *Journal of Private Equity*, Vol. 22, No. 4, Fall 2019, 11-18.

Venture Capital

Venture capital firms invest equity into young companies that have prospects for attractive growth and value creation. Investors include venture capital funds and venture arms of corporations. Investments include startups, early-stage, and emerging companies. Historically, a majority of venture investments have lost money, but large gains by a few successful investments have allowed the industry to generate positive returns.¹¹³

Forms of venture capital have been around for centuries. For example, the U.S. whaling industry, which peaked around 1850, had many of the characteristics of modern venture capital. Whaling involved high-risk and high-reward ventures that had a pattern of payoffs that would be familiar to any contemporary venture capitalist.¹¹⁴

Origins. In the early part of the 20th century, startups were funded largely by wealthy families and individuals. Today, we would call them “angel” investors. Examples include firms such as Pan American World Airways, Eastman Kodak, and Ford Motor Company. Many of the early venture capital firms, then called “investment development companies,” were founded by monied and prominent families, including Rockefeller Brothers, Inc. (1946), T. Mellon & Sons (1946), and J. H. Whitney & Company (1946).¹¹⁵ The story is that the term “venture capital” was first used in a conversation between Jock Whitney and Benno C. Schmidt Sr., the co-founders of J. H. Whitney & Company, in 1946.¹¹⁶

The formation of American Research and Development Corporation (ARD) is often associated with the birth of the venture capital industry as we know it today. Founded in Boston, Massachusetts by prominent bankers, academics, and businessmen, ARD raised \$3.5 million for a closed-end fund in the fall of 1946, with more than one-half coming from institutional investors. Many early deals were due to affiliations with MIT and Harvard.

One of the founders of ARD was General Georges Doriot, then a professor at Harvard Business School. He taught a course called *Manufacturing* that was really “all about starting companies and technology.”¹¹⁷ A number of his students and disciples went on to be prominent venture capitalists, including Tom Perkins (Kleiner Perkins), Don Valentine (Sequoia), Bill Elfers (Greylock Partners), Arthur Rock and Dick Karmlich (Arthur Rock & Company), and Bill Draper and Pitch Johnson (Draper & Johnson Investment).

Despite some positive press, ARD bumped along for decades until in 1957 it made its most famous investment: a 70 percent stake in Digital Equipment Corporation (DEC) for about \$70,000. ARD’s stake in DEC grew more than 50-fold by 1971, and ARD was sold to Textron in 1972. ARD’s return from inception to sale was 14.7 percent and would have been half as high without the investment in DEC.¹¹⁸

The passing of the Small Business Investment Act of 1958 was another key moment in the history of venture capital. The act enabled the formation of small business investment companies (SBICs) that allowed for licensed and regulated pools of capital for the express intent of investing in new and early-stage businesses. The government provided inexpensive capital that the SBICs could lever four-to-one.

The act opened the floodgates for enterprising financiers. By 1962 there were 590 licensed SBICs, and the number swelled to 722 in 1964. In the early 1960s, SBICs accounted for three-quarters of venture capital investments.¹¹⁹ But nearly one-third of these ended up as problematic, and regulations were put in place to limit the number of SBICs. By the late 1970s, just one in every five dollars of venture capital in the U.S. was attributable to an SBIC, and that figure dropped to below one in every ten dollars by the late 1980s.

The IPO market was hot in the late 1960s, allowing for some attractive exits.¹²⁰ In 1967, there were 100 IPOs that enjoyed an average first-day gain of 38 percent. The IPO market gained momentum in 1968, with 368 deals and a one-day pop of 56 percent. The peak was 1969, when there were 780 IPOs. But the first-day returns

returned to earth, albeit a level that is still attractive at 13 percent. To put this in perspective, the IPOs in 1969 alone equal 20 percent of the total number of public companies today.¹²¹

The popping of the IPO bubble, the reduction in the number of SBICs, and the bear market of 1973 combined to slow the venture capital industry substantially for most of the 1970s. While capital commitments to the industry exceeded \$200 million in 1969, flows were \$50 million or less until 1978. Institutional investors were wary of the returns, liquidity, and appropriateness of the asset class.

A slew of legislation, including the 1978 Revenue Act, the 1979 “Prudent Man” rule, the 1980 Small Business Investment Incentive Act, and the 1981 Economic Recovery Tax Act, revitalized the venture capital industry (see exhibit 16). These laws lowered capital gains taxes, reduced regulation, and made venture capital more attractive for institutional investors.

Capital flows roared back into the industry in the 1980s. Within a decade after 1978, the number of venture capital firms more than tripled, investment in capital grew 8 times, and the number of funded companies rose more than 4.5 times.¹²² The hub of the industry shifted to the San Francisco Bay Area, where it remains today. More than one-half of U.S. venture capital’s AUM are based in the Bay Area, and that figure rises to almost three-quarters if you include Boston and New York City.¹²³

This success was intimately related to the development of new technologies, including the personal computer and biotechnology, and a cadre of firms known for underwriting technology deals that included Alex Brown & Sons and Hambrecht & Quist. As with the 1960s, however, the flow of capital led to substandard returns and a general retrenchment into the early 1990s. Flows in the early 1990s returned to an anemic state.

The venture capital industry then went through its greatest period ever starting in the mid-1990s. This was in part fueled by the adoption of the Internet, ushered in by the meteoric rise of Netscape, an Internet browser, following its IPO in August 1995. By the end of 2000, one of every five publicly-traded companies was venture-backed, and those companies represented about one-third of the equity market’s capitalization.¹²⁴

The dot-com bust, along with a three-year bear market, again tempered enthusiasm for the asset class. Commitments in 2003 were nearly one-tenth of those in 2000. But the industry once again climbed out of the lull. Commitments in 2007 were nearly triple those of the 2003 level, only to again fall as a consequence of the great financial crisis. The trend in commitments has been steadily higher since 2010. There are about 1,300 venture capital firms in the U.S. today.

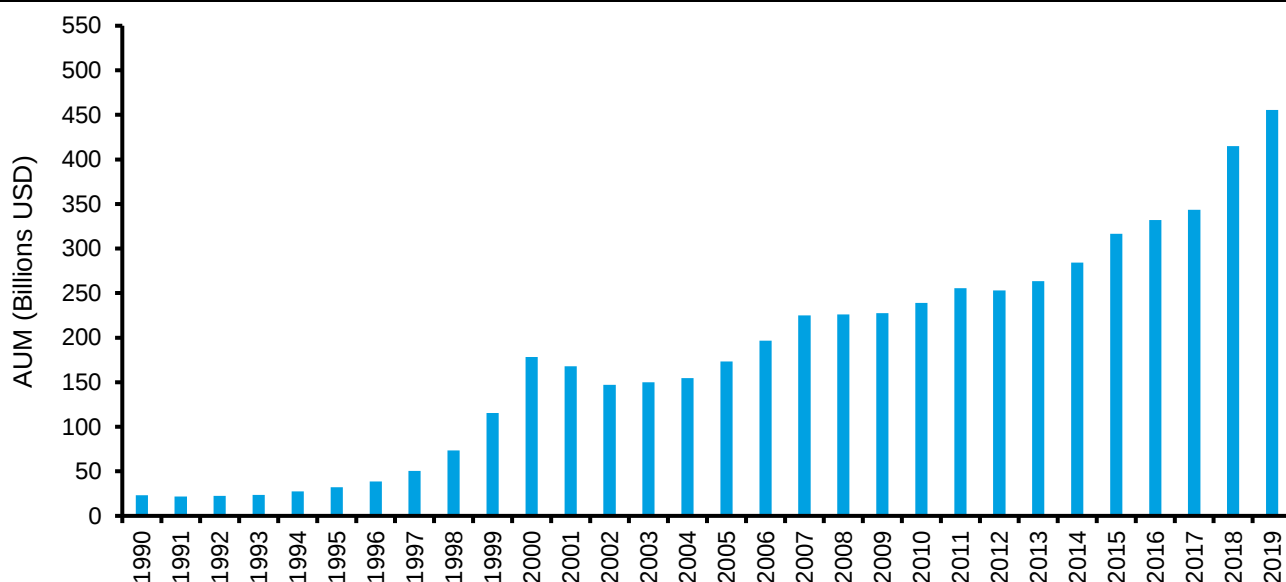
Public markets, buyouts, and venture capital are all cyclical, but venture is the most cyclical of the three.¹²⁵ This in part reflects price discovery, correction mechanisms, and liquidity. Public markets are subject to bouts of excessive optimism and pessimism, but in general price discovery and liquidity function well.

Buyouts are of companies that are generally profitable and somewhat predictable. They also commonly have public market comparables that can guide price discovery. Venture involves young firms with unknown prospects. There are fewer correction mechanisms in venture than in public markets. A limiting factor is the time between capital commitment and return of capital. Investors can time their commitment but have no control over when that capital gets called or when the fund will exit investments.

Industry Structure. We now review the structure of the industry, what the firms are doing, fund performance, and the outlook.

Exhibit 35 shows the AUM for the U.S. venture capital industry from 1990 to 2019. Today, AUM is about \$455 billion with dry powder of about \$120 billion.

Exhibit 35: Assets Under Management for U.S Venture Capital, 1990-2019

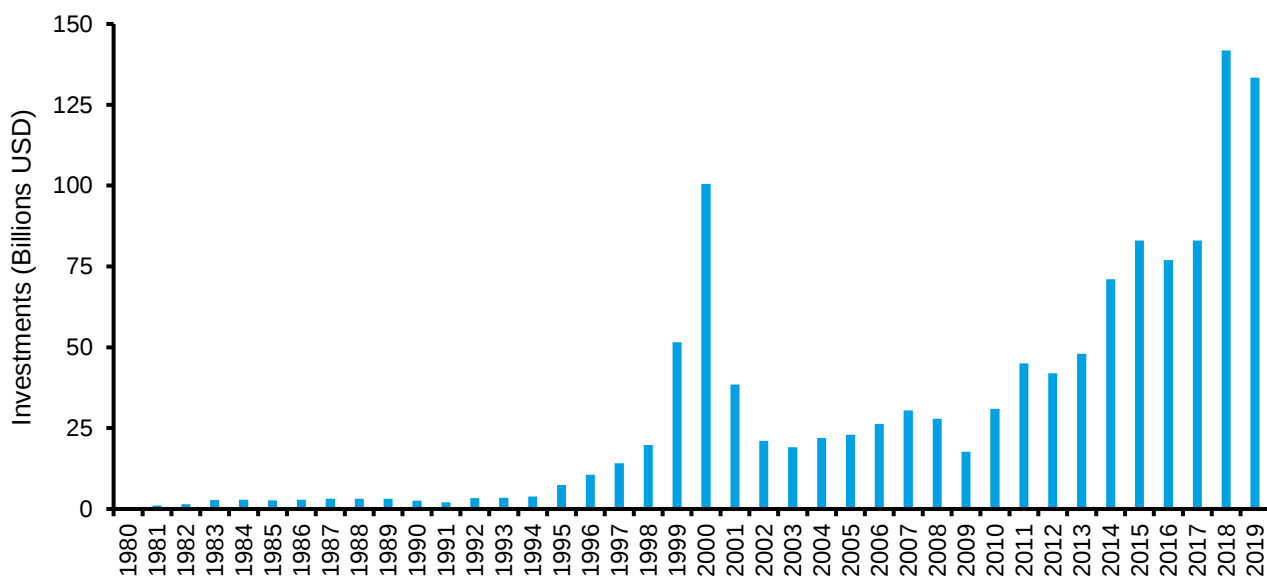


Source: PitchBook; NVCA Yearbook 2010; and Counterpoint Global estimates.

Note: As of September 30, 2019; AUM is dry powder plus remaining value.

Exhibit 36 shows annual investment levels for the venture capital funds. Not until 2018 did the investment exceed that of 2000, but recent years have seen strong levels of investment. Over the decades there has been a very high correlation between investor commitments, or flows, and average deal size.¹²⁶ As with most asset classes, strong inflows into venture capital are associated with below-average subsequent returns.¹²⁷

Exhibit 36: U.S. Venture Capital Annual Investment, 1980-2019



Source: NVCA 2010 and 2020 Yearbooks.

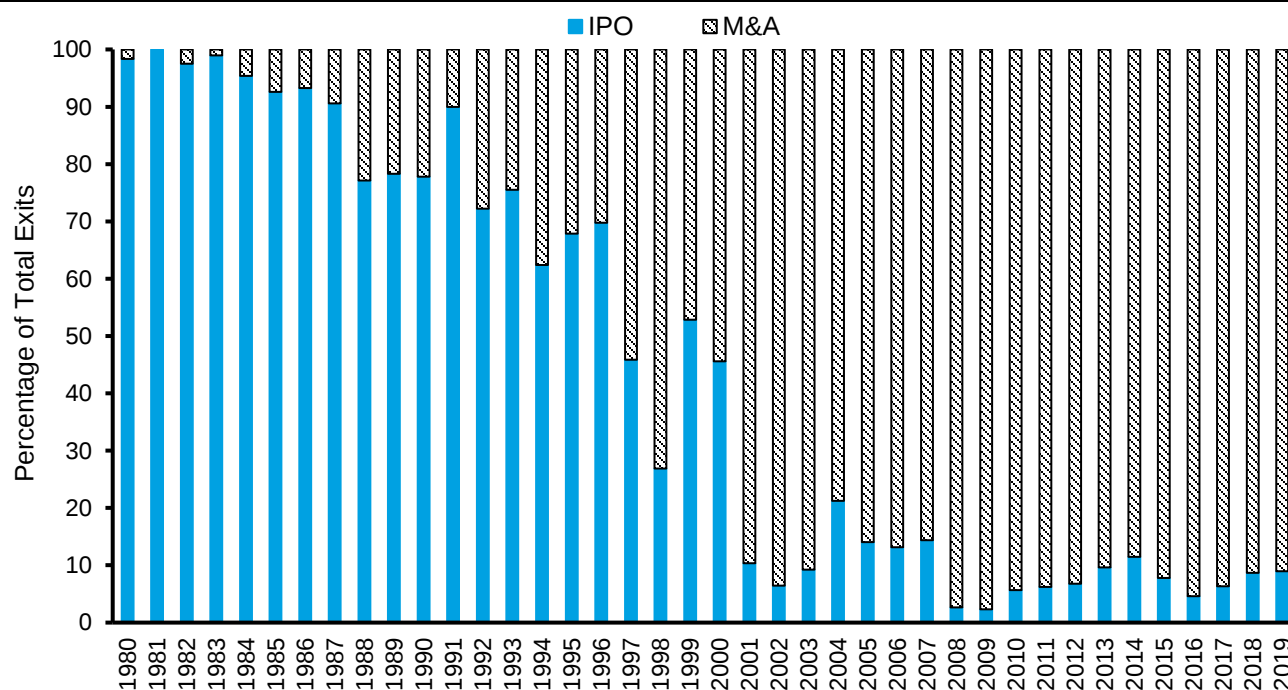
The fee structure for venture capital funds is similar to that of buyouts. The management fee is typically 2 percent of the total amount raised by the fund, and the incentive fee is commonly 20 percent of profits. But venture capital and buyouts differ in their ability to scale. In buyouts, doing large deals is not materially different than small deals. As a result, buyout firms can grow their AUM with less degradation of expected returns than can venture firms.

Venture capital firms focus on relatively young and immature companies, and part of the value proposition is helping entrepreneurs build their businesses. This activity does not scale as well as buyouts do.¹²⁸

Exits. The return for any fund is a function of the difference between the purchase and subsequent sale of investments. From the beginning of the venture industry through the mid-1990s, an IPO was the most common way to profitably exit a venture investment.¹²⁹ In the late 1990s through 2000, both IPOs and a sale of the business were popular. But since 2000, IPOs have declined substantially, and a sale, either to a strategic buyer or a buyout fund, has become the preferred vehicle for exit (see exhibit 37).

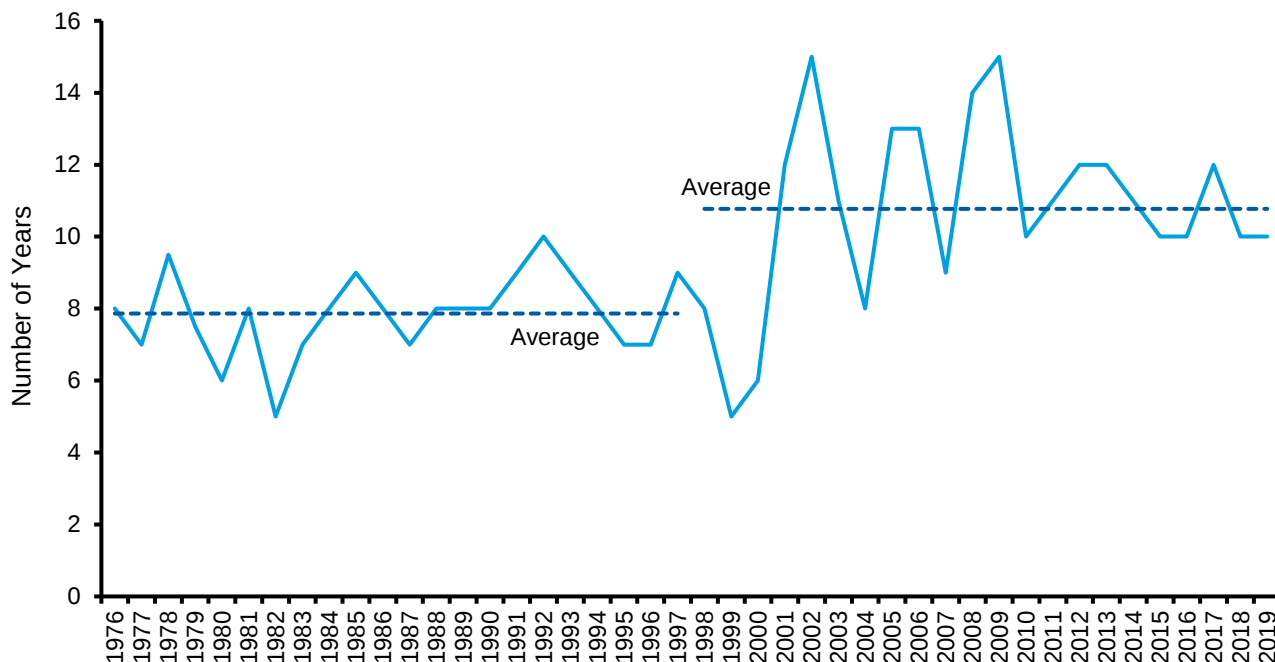
Note that roughly 60-65 percent of venture investments end up with a “multiple of invested capital” of less than 1.0, and 25-35 percent fail. Further, the median and mean return on IPOs is significantly higher than that for M&A exits, and the median M&A exit is for a loss.¹³⁰ There are a number of drivers behind the trend of fewer exits through IPOs.

Exhibit 37: Evolution of Exits for U.S. Venture Capital, 1980-2019



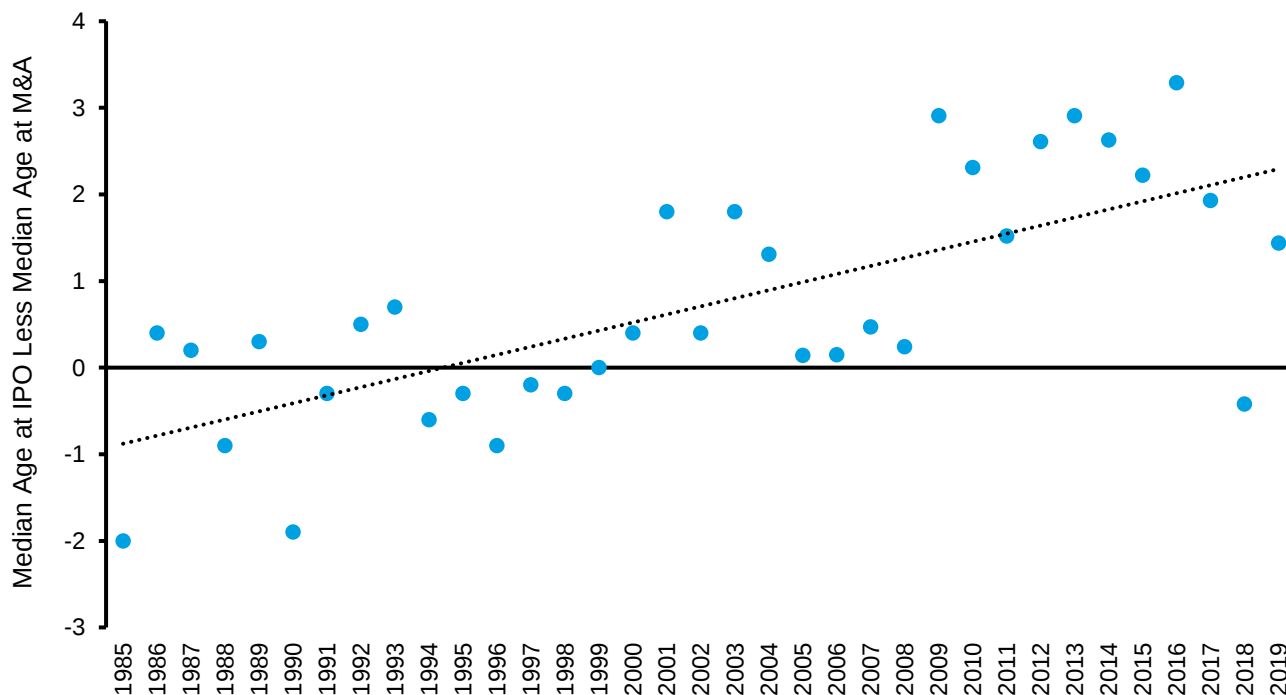
Source: NVCA 2010 and 2020 Yearbooks.

First, because the cost to list has risen in recent decades, only larger and typically older companies are in a position to list. The age of a company doing an IPO has risen as a result. Exhibit 38 shows that the median age of a company doing an IPO was 7.9 years old from 1976 to 1997 and 10.8 years old from 1998 to 2019. This is a 37 percent increase. If we extend the first period through the dot-com boom, the median age has increased closer to 50 percent from 1976-2000 to 2001-2019.

Exhibit 38: Median Age of U.S. Companies Doing an IPO, 1976-2019

Source: Jay R. Ritter.

In the late 1990s, the average time for an exit via an IPO was less than an exit by acquisition for a venture-backed company. Exhibit 39 shows how that trend has shifted over time. Today, VCs are quicker to sell a business, often to an incumbent, than to wait and do an IPO.¹³¹

Exhibit 39: Median Age at IPO versus Median Age at Acquisition, 1985-2019

Source: 2015 and 2020 NVCA Yearbooks.

Second, the motivation to go public has shifted. Young companies today don't need to raise capital from the public market because they are generally less capital intensive than their predecessors. For example, companies that did an IPO in the 1970s had lower gross margins, selling, general, and administrative (SG&A) costs, and research and development (R&D) expenses than those that went public in the 2000s. They also had higher capital expenditures as a percentage of sales.¹³²

Third, even those companies that are in very competitive industries have been able to stay private because there is a huge amount of capital available via late-stage funds. The basic story is that initial funding comes from venture capital firms that invest in companies in the early stages, and companies continue to raise rounds of financing backed by funds that invest in later stages. The key is that the valuations for companies tend to rise with progressive rounds, creating the appearance of wealth creation without a tangible price that a sale or stock price provides.

DoorDash, a food delivery company, is a good example of the process. Its first formal round of venture capital, Series A, was \$17 million, which valued the company at \$72 million. Since then the company has raised \$2.4 billion in 7 rounds. The latest round was \$400 million and implied a value of \$16 billion.¹³³ This amount of capital allows the beneficiaries to spend a lot of money away from the scrutiny that public markets impose. DoorDash is reported to have lost \$450 million in 2019.¹³⁴

Finally, there are now ways for employees who are compensated in equity to sell shares. In some cases, funding rounds give employees a chance to cash out. For example, Airbnb, Inc. raised an \$850 million round that allowed employees with sufficient tenure to sell \$200 million worth of stock.¹³⁵ In addition, a number of marketplaces, including SharesPost, Forge, EquityZen, NASDAQ Private Market, ClearList, and Carta, provide liquidity for sellers and buyers. About one-half of private companies surveyed allow their employees to sell shares.¹³⁶

These drivers have important consequences for investors.

There is now a sizeable population of companies that are very valuable on paper. For example, CB Insights, a platform that tracks market intelligence in the technology industry, counts 225 “unicorns” in the U.S. worth a combined \$662 billion as of July 2020.¹³⁷ A unicorn is a young company “valued at \$1 billion [or more] by private or public markets.”¹³⁸ It is often the case that a relatively thin slice of investment raises the presumed value of the entire enterprise.

Naturally, entrepreneurs seek to build valuable companies, and venture capitalists want to find companies that will deliver high returns on investment. But there are many reasons to be cautious about the headline figures.

To begin, there are now numerous examples of companies that have not lived up to their high valuations. These include Theranos (which peaked at \$9 billion and later dissolved) and WeWork (which went from \$47 billion to \$8 billion in 2019). Raising a substantial amount of capital implying a high valuation does not by itself confer success.

Price discovery is stunted in private markets, as only optimists invest and there is no mechanism for pessimists to express their view. The sunlight of an IPO can be the best of disinfectants from overvaluation and can improve productivity.¹³⁹ From 2011 through 2019, about one-third of the companies that went public had a valuation below that implied by the final round of private financing.¹⁴⁰

In a survey published in 2020, more than 90 percent of venture capitalists said unicorns were overvalued and a majority of them thought they were “significantly” overvalued. Forty percent of those who were surveyed said

they had invested in a unicorn, but there was no difference in opinion about overvaluation between those who had and had not invested in unicorns.¹⁴¹

Valuing young companies is an inherently tricky task. But complicated capital structures are the main reason that many headline valuations are overstated. The method most investors use to value a business is to take the price paid for the last round of shares and multiply it by the total number of shares outstanding. For example, if a startup with 8,000,000 shares raises \$200 million by selling 2,000,000 shares at \$100 each, the “post-money” value of the company is now deemed to be \$1,000,000,000 (10,000,000 x \$100), reaching unicorn status.

This math is misleading because the equity financing rounds commonly have different rights with regard to cash flows and downside protection. Unlike the common stock of most public companies where all shareholders have essentially the same rights, the classes of equity in startups can vary greatly from one another. These differences include IPO return guarantees, vetoes over IPOs at a price lower than the current round, or capital structure seniority. Academics who studied unicorn valuations found eight share classes per company on average.

These professors analyzed the financial terms from legal filings and found that reported post-money valuations for unicorns are roughly 50 percent above fair value on average, and for about 10 percent of their sample the valuation was double fair value. Nearly one-half of the 135 companies in their sample lost unicorn status after they made all of the appropriate adjustments.¹⁴²

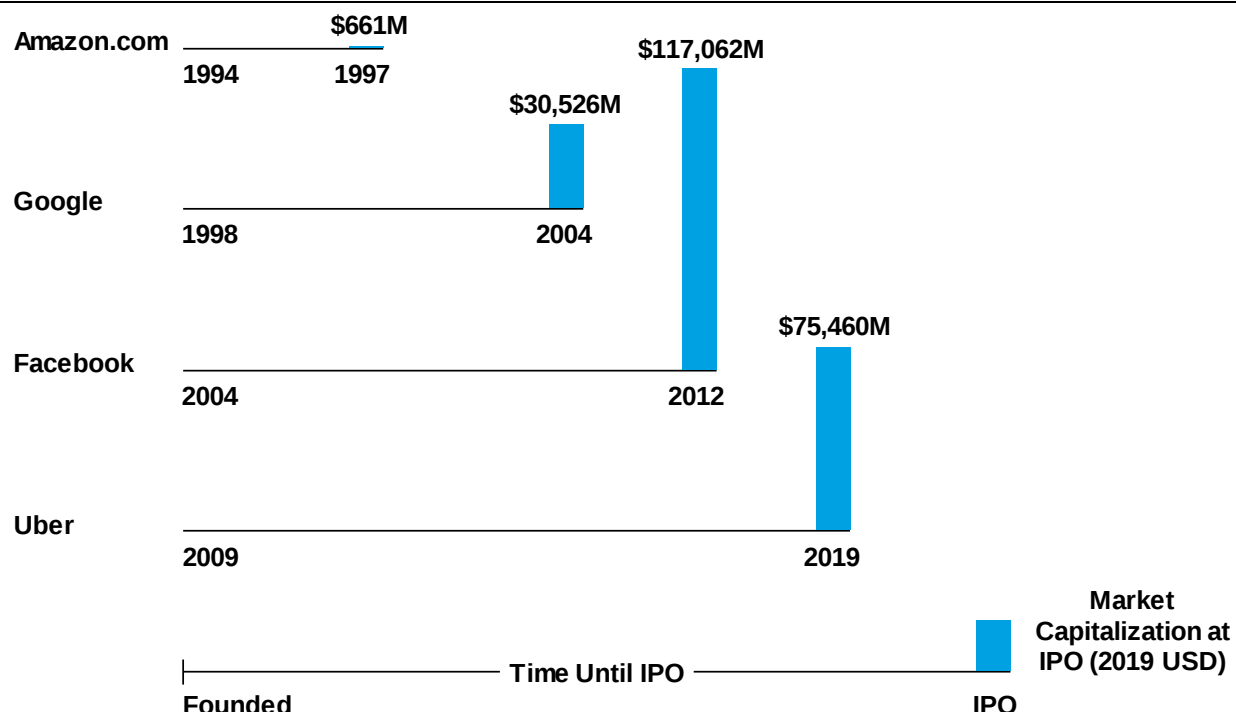
Another consequence of staying private longer is that more wealth is created in the private market and less in the public market. While individuals are ultimately the beneficiary of the private wealth creation through pension funds or endowments that invest in venture capital funds, a normal individual investor is largely shut out from that source of wealth.

Exhibit 40 shows the time from founding to IPO and the market capitalization at IPO for Amazon.com, Google, Facebook, and Uber. Amazon, which was backed by the venture capital firm Kleiner Perkins, came public 3 years after it was founded with a market capitalization of \$660 million (in today's dollars). Investors who bought at the IPO and held their shares have made more than 1,800 times their money through June 30, 2020.

Google did an IPO 6 years after its start, and shareholders have made 33 times their money. Facebook went public 8 years following its founding with a market capitalization of \$117 billion. Shareholders have made 6 times their money. Uber went public 10 years after founding with an initial market capitalization of \$75 billion.

Virtually none of the \$1.3 trillion in value that Amazon built was in the private market. Three percent of the value created by Alphabet, which controls Google, was in the private market, and that percentage was about 17 percent for Facebook. And the implied value of Uber in the private market was more than 100 percent of the total value created, as the company's market capitalization is below what its IPO price implied.

Exhibit 40: Time to IPO and Market Capitalization at IPO: Amazon, Google, Facebook, Uber



Source: Company reports and Counterpoint Global.

Despite the decline and delay of IPOs, many venture capitalists view an exit into the public market as attractive due to the accountability and transparency associated with being a listed company. At the same time, it has become more common for entrepreneurs and investors to consider a sale to a special purpose acquisition company (SPAC) or a direct listing as alternatives to a traditional IPO.¹⁴³

In a customary process for an IPO, an issuer selects an underwriter that helps with regulatory issues, marketing, pricing, and post-deal price stabilization. Underwriters also generally have an overallotment option (commonly called a “greenshoe”). In return, the issuer pays an underwriting fee, typically 4-7 percent based on the size of the IPO, and agrees to a lockup that prevents certain shareholders from selling for a specified time, usually 90 to 180 days. It is common for venture capital funds to hold their shares well beyond the IPO and lockup, so they have an interest in seeing a company continue to thrive.¹⁴⁴

A SPAC is a company that goes public with the goal of using the offering proceeds to make an acquisition. In an IPO, a SPAC offers a unit that includes a common share at a set price and warrants. SPACs are sometimes referred to as “blank-check” companies and can provide public market investors access to private companies. Because a deal involves negotiation only between the SPAC and the target, the transaction tends to be more straightforward, sure, and transparent.

With a direct listing, a stock exchange builds an order book, whereby buyers and sellers express their interests in terms of price and volume. The exchanges do this every day for every stock. The opening price reflects the intersection of supply and demand. Buyers include any investor, and sellers include shareholders, such as employees and early-stage investors. Neither buyer nor seller has an obligation to transact.

Ideally, the process of going public should meet the standards of market-based price discovery and equal access for investors. Exhibit 41 shows the strengths and weaknesses of these methods of going public.

The strength of an IPO is that underwriters can provide issuers with significant guidance throughout the process. While a company typically goes public only once, investment banks have substantial experience and expertise. Further, an IPO allows a company to raise capital to fund growth, to pay down debt, or for other general corporate purposes.

IPOs also have weaknesses. First, they are relatively expensive. Beyond underwriting fees, regulatory and legal costs can add up to another two percent of the offering proceeds.¹⁴⁵ Second, it is also common for underwriters to price IPOs at a discount. In the ten years ended 2019, the average return for an IPO on the first day was 17 percent. This amounts to more than \$43 billion of foregone proceeds, a sum more than twice the underwriting fees on average.¹⁴⁶ Lockup expirations later create downward pressure on shares.¹⁴⁷ Finally, allocations to IPOs are not determined solely by interest.¹⁴⁸

A SPAC provides the buyer and the seller with more certainty. It also avoids issues with limited liquidity and offers access to all investors. However, SPACs also have relatively high fees.

The strength of direct listings is that they provide market-based price discovery and a larger pool of buyers and sellers. They also have lower fees than IPOs and SPACs. The main weakness is that a company cannot raise capital, though regulators and exchanges are discussing ways to address this limitation. Because there have been very few direct listings to date, it is difficult to know how these stocks will trade post-pricing. High profile direct listings include Spotify, a media services provider, and Slack, a business communication platform.¹⁴⁹

Exhibit 41: A Comparison of IPOs, SPACs, and Direct Listings

	IPO	SPAC	Direct Listing
Strengths	• Can raise primary capital • Established mechanism—underwriters have significant experience with the process: - Provide regulatory guidance - Market to investors and advise on pricing/allocation - Often guarantee the sale of a certain amount of stock and provide post-issuance price support	• Faster and simpler than IPO for target company (less financial and business disclosures and regulatory scrutiny) • More straightforward process for target company, which deals with one party and agrees to a fixed price • More flexibility and liquidity for SPAC investors • Provides access to all investors	• Market-driven price discovery • Democratic allocation based on demand • More liquidity • Existing shareholders can avoid dilution • Lower fees than IPOs and SPACs • No lockup period
Weaknesses	• Higher fees than direct listings • First day price pop suggests company could have raised more capital • Allocation not strictly based on market demand • Less trading volume/liquidity	• Higher fees than direct listings • No market-driven price discovery—still opportunity for first day price pop • Uncertainty for investors in the SPAC IPO regarding the eventual target company and the price • Target company unsure of how much capital it will raise	• Cannot raise primary capital • Limited experience/history • No post-issuance price support

Source: Counterpoint Global; "What to Know About Direct Listings—From a Banker," Morgan Stanley Global Capital Markets, November 21, 2019; and Nicholas Jasinski, "SPACs Are All the Rage, but These Private-Equity-Like Vehicles Are Complicated. Here's What You Need to Know," Barron's, July 31, 2020.

A final consequence of staying private longer is that the combination of steady flows of capital into venture and later exits means a much larger share of the industry's total investment is late-stage. For example, in 1980 around 10 percent of investments were late stage. By 2006, roughly 20 percent of dollars went to investments of \$50 million or more, and that figure was closer to 60 percent in 2019.¹⁵⁰ The capacity for early-stage investments is much smaller than that for late-stage investments. This has important implications for risk and returns.

Many investors look to alternative investments, and venture capital in particular, to deliver high returns. But the risk and reward is very different for early- versus late-stage venture. Early-stage venture has a very high failure rate, and a few investments create all of the attractive expected returns. Late-stage venture has a failure rate one-half as high as early-stage, but the expected returns are commensurately lower.¹⁵¹

This puts fund size into clear focus. Contrast two well-known venture capital firms, Benchmark Capital and the venture arm of SoftBank Group. In 2020, Benchmark is seeking to raise \$425 million for its tenth fund, a size similar to its three prior funds.¹⁵² SoftBank, through its Vision Fund, raised \$100 billion in 2017. Softbank reportedly invested \$14 billion in WeWork, \$7.7 billion into Uber, and \$5 billion into Oyo Rooms.¹⁵³ Deploying that much capital in relatively immature companies and achieving a high return on investment is difficult.

We saw that the expected returns were lower for large buyout funds that followed smaller funds. The same is true for venture capital, but the effect is even more pronounced.¹⁵⁴

One important feature of venture capital is the persistence of returns. We saw that the persistence of returns for top-performing buyout funds waned in the 2000s versus prior decades.

This is not true of venture capital, where persistence remains high. Exhibit 42 shows that a top quartile fund had nearly a fifty percent likelihood of being followed by another top quartile fund. This was true before 2001, as shown in the left panel, and after 2000, as shown in the right panel. We would expect a 25 percent probability of the returns staying in the same quartile if the outcomes were dictated by chance.

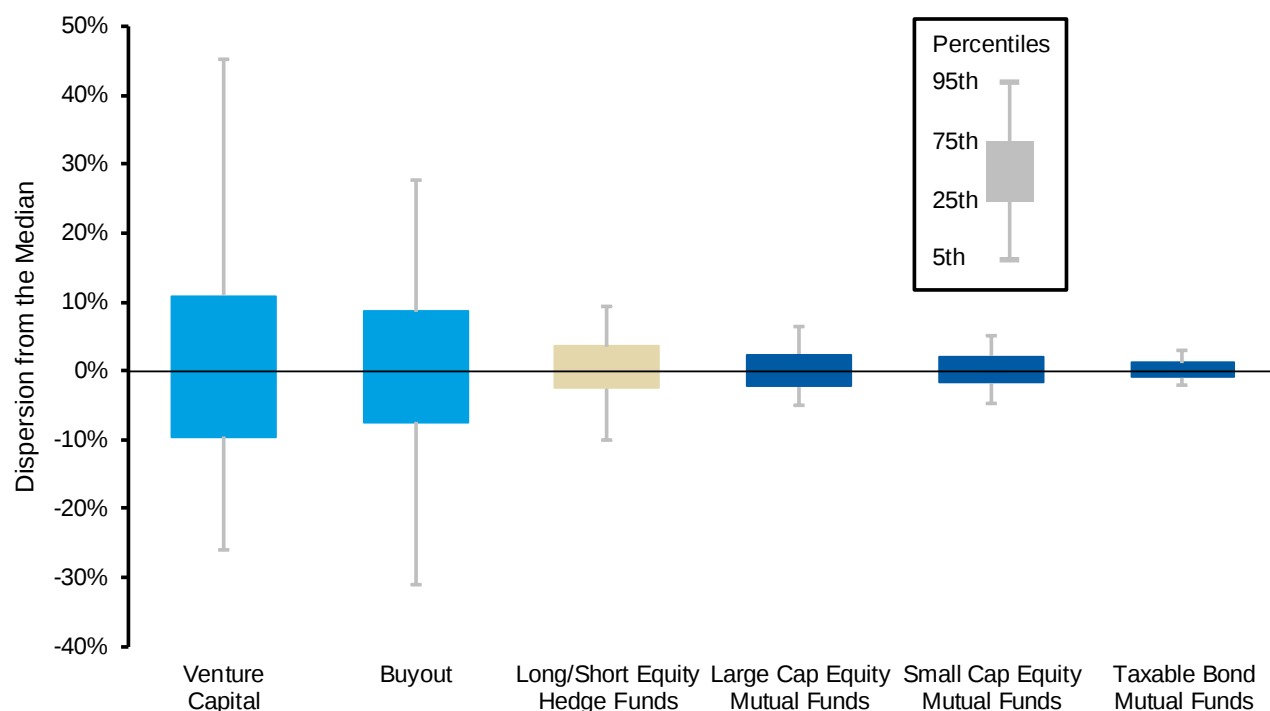
Exhibit 42: Persistence for Venture Capital Funds

Pre-2001		Subsequent Fund Quartile				Post-2000		Subsequent Fund Quartile			
Previous Fund Quartile		1	2	3	4	Previous Fund Quartile		1	2	3	4
	1	49%	14%	23%	14%		1	48%	20%	26%	6%
	2	33%	27%	27%	13%		2	24%	43%	12%	22%
	3	27%	36%	18%	20%		3	17%	23%	42%	19%
	4	9%	20%	26%	46%		4	23%	14%	34%	29%

Source: Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, and Rüdiger Stucke, "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds," Darden Business School Working Paper No. 2304808, August 30, 2014.

The dispersion between the best and worst funds is very high in venture capital relative to other asset classes (see exhibit 43). As we reviewed earlier, median returns to investors have been lackluster since 2000, but this hides the fact that top performing funds have generated very good returns.

Exhibit 43: Dispersion of Returns for Active Managers in Various Asset Classes



Source: Morningstar Direct and PitchBook.

Note: Returns for venture capital and buyout are based on net internal rates of return since inception for vintage years 1980-2018; returns for hedge funds and mutual funds are based on trailing 5-year annualized returns net of expenses with income reinvested through 12/31/2019.

Identifying which funds are in the top quartile can be tricky. Indeed, more than one-quarter of all funds claim to be in the top quartile. The reason is that there are different ways to measure results, including various benchmarks, performance measures, and data sources.

For instance, three leading data sources, VentureXpert, Preqin, and Cambridge Associates, show similar patterns in returns since 1980 but have meaningful variance in any given year. Preqin tends to report the highest returns and VentureXpert the lowest, but the returns by all three have been more tightly clustered since 2000.¹⁵⁵

Outlook. The outlook for returns from U.S. venture capital in the aggregate, given investor commitments and fund investments, appears to be consistent with the recent past. The dispersion of returns within the asset class suggests that investors who have access to top tier funds will continue to earn very attractive returns. It also stands to reason that the large swell of investment in late-stage venture will earn lower returns than the smaller sum invested in early stage.

Where From Here?

We now turn to some thoughts about where the industry may go from here. Considerations include potential asset growth, industry capacity, valuation, competition, and fees.

Buyout and venture capital funds continue to have good potential for asset growth. Exhibit 44 shows one way to think about the opportunity.¹⁵⁶ U.S. investors, including individuals, pension funds, insurance companies, and endowments, owned about \$31 trillion of equity at year-end 2019. Add non-U.S. investors and the equity ownership grows to nearly \$39 trillion.

Exhibit 44: What A One Percent Shift in U.S. Equity Holdings Implies for Private Equity AUM

Investors	Value of U.S. Equity Holdings (\$B)	Private Equity AUM Change with 1% Shift from Public to Private Equity (\$B)
U.S. Households and nonprofit organizations	21,076	211
U.S. Pension funds	6,281	63
U.S. Insurance companies and non-financial business	3,366	34
Foreign	8,179	82
Total	38,902	389

Source: Board of Governors of the Federal Reserve System.

Note: As of December 31, 2019.

The question is whether investors will continue to allocate assets to private equity. There appears to be continued appetite to do so. For example, nearly one-half of institutional investors in North America surveyed by BlackRock, an investment management firm, said they intended to increase their allocation to private equity “slightly” or “significantly.”¹⁵⁷ Forty percent of endowments and foundations plan to invest more money in private equity.¹⁵⁸

Following a June 2020 letter from the Department of Labor, individual investors may now have a greater opportunity to invest in private equity through their retirement plans. The Department of Labor said defined contribution plans can offer private equity as an investment option while remaining in compliance with ERISA. Defined benefit plans have long invested in private equity, but defined contribution plans have avoided it largely due to fears of litigation. The SEC is also examining ways to make private investments more accessible to individual investors.¹⁵⁹

As exhibit 43 suggests, every 1 percent shift in asset allocation from public to private equities represents about \$390 billion in assets. For context, the commitment to U.S. buyouts and venture capital were approximately \$315 billion in 2019.

The primary reason investors look to allocate more money to buyouts and venture capital is because they expect the returns to be higher than in public markets. In a recent survey of institutional investors, 88 percent said they had target annual returns for private equity of 8 percent or more, and 40 percent had target returns of 14 percent or more.¹⁶⁰ A survey of private equity general partners in 2012 revealed that nearly 90 percent of them marketed internal rates of return of 15 to 30 percent to their prospective limited partners.¹⁶¹ While that figure is surely lower today, limited partners perceive private equity to remain an important source of high returns.

Part of the justification for the belief in higher returns comes from the fact that the ratio of value created in the private markets, relative to that of the public markets, has increased versus what we saw decades ago. The

contrast between Amazon.com, where nearly all of the company's value was created in public markets, and Uber, where the company's current public value is less than its last private value, brings this point into focus.

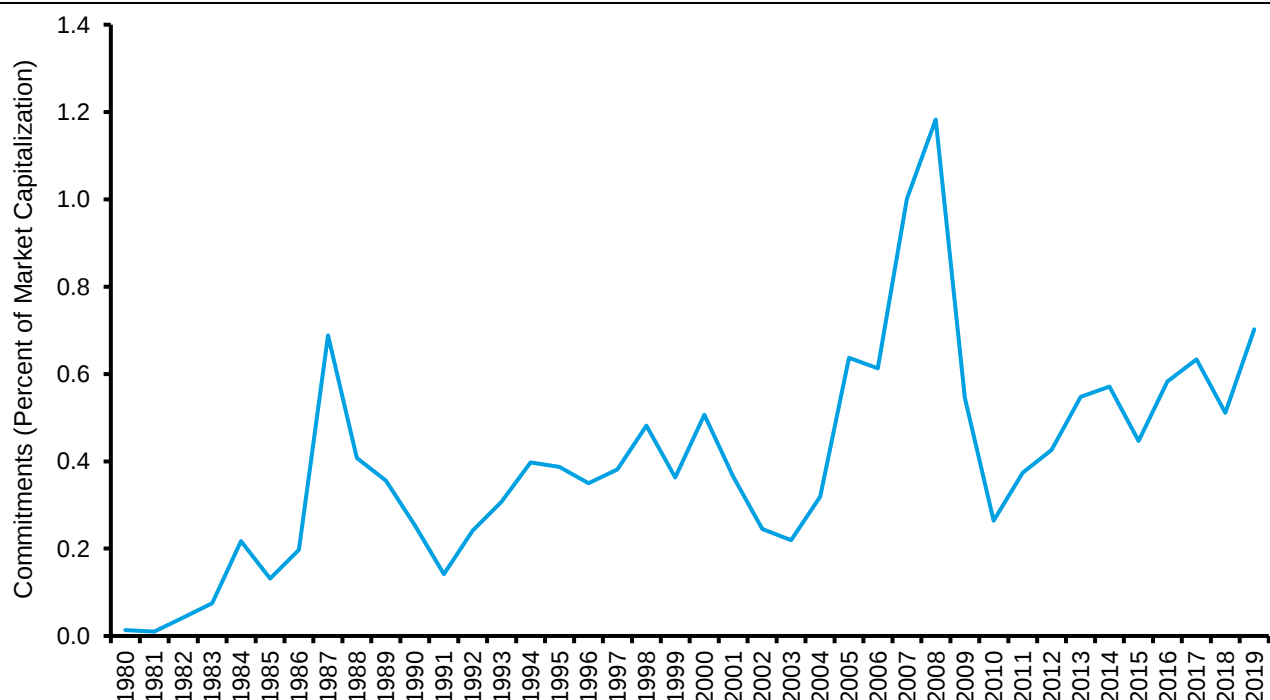
Finally, in private markets the reported volatility of returns is lower, liquidity is poor, and the time from commitment of capital to return of capital is longer than in public markets. These can confer advantages in behavior by compelling a long-term orientation.

Investors may want to allocate more of their portfolios to buyout and venture capital funds, but that desire has to be balanced against the industry's capacity. Ultimately, capacity reflects the set of opportunities and the cost to monetize them. One way to measure effective capacity is through the concept of wealth maximization. One measure of wealth maximization is excess return adjusted for risk, or alpha, times AUM. For example, a fund that generates 2 percentage points of alpha on \$1 billion of capital creates \$20 million in wealth ($\$20,000,000 = .02 * \$1,000,000,000$).

In most cases, expected alpha declines as AUM grows. This makes sense because as AUM grows the opportunity set shrinks. In theory, a fund that is managed with skill will expand its AUM to the point that expected alpha approaches zero. Because investors anticipate that buyout and venture capital funds will earn returns in excess of public markets, it makes sense to enhance the concept of capacity with a threshold of positive alpha.¹⁶² In other words, capacity equals how big a fund can get while still generating expected alpha of one or two percentage points per year.

One way to look at the issue for buyouts is to consider commitments to the asset class divided by market capitalization. The average commitment level was just under $\frac{1}{2}$ of 1 percent of the market from 1980-2019, and experience shows that PME are poor when the ratio substantially exceeds that amount, as it did in the late 1980s and mid-2000s (see exhibit 45).

Exhibit 45: Commitments to U.S. Buyout Funds as a Percent of Market Cap, 1980-2019



Source: NVCA 2010 Yearbook; PitchBook; World Bank; and Center for Research in Security Prices.

Note: 1980-2005 data includes commitments to mezzanine capital.

Further, the industry had \$560 billion in dry powder at year-end 2019, which is capital that is ready to be invested, and recent multiples paid for businesses are at all-time highs. High multiples are consistent with competition for assets. While there is likely industry capacity, especially when considering investment opportunities outside the U.S., these factors suggest that buyout funds will find it challenging to generate compelling PMEs.

Both buyouts and venture capital are cyclical, but venture capital is the more cyclical of the two. The mismatch between supply and demand of venture capital explains much of this.¹⁶³ Supply is a function of the willingness of investors to commit capital. This inclination to invest can be the result of the relaxation of regulatory barriers and is in theory supposed to reflect expected returns. In reality, flows often mirror past returns. Investors do in the present what they should have done years before.

Demand is a function of how many entrepreneurs have good ideas. Demand shocks often come with important technological changes, including the semiconductor industry, personal computer hardware and software, biotechnology, the Internet, mobile, and cloud computing. Investing in start-ups is a very labor-intensive business for venture firms. And even with the introduction of new technologies, the number of talented entrepreneurs is limited.

The trend toward later-stage investing in the venture industry suggests that the capacity for start-up investing is limited. This industry had \$120 billion in dry powder at the end of 2019, which is 2.4 times the capital raised during the year. There is likely very limited capacity for investments in the first, or Series A, round of venture capital. Late-stage equity may have more capacity but investors should have more muted expectations for returns.

Strong flows into the industry combined with high levels of dry powder mean that buyout and venture funds have a lot of pressure to put capital to work. This has had an impact on valuation. As we have seen, valuations have trended higher in both the buyout and venture industries.

In buyouts, the most common measure of valuation is the EV/EBITDA multiple.¹⁶⁴ While at record levels, the headline multiple needs to be considered in the context of interest rates that stand at a generational low. That said, a substantial percentage of the return for buyout funds in recent years has come from the ability to exit at a multiple higher than that at entry. A flattening or degradation of multiples will further pressure returns.

In venture capital, valuation is trickier because the capital recipients are often young, unproven companies that are commonly in the stage of the corporate lifecycle where they lose money.¹⁶⁵ But the sizeable sums that have gone into these companies, the large number of companies claiming unicorn status, and the uneven performance of unicorns as they go public suggest valuations are full.¹⁶⁶

Competition is also a crucial consideration. This starts with the competition buyout and venture capital funds face in buying businesses. Buyout firms compete with one another as well as with strategic buyers and even public market investors. Venture capitalists compete to find the next big company. Offsetting this to some extent is the fact that buyout and venture capital firms commonly co-invest. Still, identifying and acquiring attractive assets is a challenging task, and the recent rise in valuations suggests that it is not becoming easier.

We also see that firms are more willing to enter into one another's markets. As we noted before, buyout funds used to primarily acquire stable and cheap small-capitalization companies. Deal sizes today include companies that have better growth prospects but are also larger and more expensive. Venture capital firms used to focus mostly on start-ups, but now they invest in more mature growth companies. One important finding is that buyout firms tend to generate worse returns in funds that drift from their original style.¹⁶⁷

The popularity of private equity has also attracted new competition. For example, Two Sigma Investments, a quantitative hedge fund, raised a fund through a new venture capital division called Two Sigma Ventures. The goal is to leverage “its parent company’s network of 1,700 data scientists, engineers and industry experts to support development inside its portfolio.”¹⁶⁸

Another entrant is the investment management behemoth Vanguard Group, which managed \$6.2 trillion in early 2020. Vanguard is partnering with HarbourVest, which has been in the private equity business since the early 1980s.¹⁶⁹ Vanguard will offer private equity products to institutionally-advised clients early on, but hopes to broaden accessibility of the asset class to more of its clients over time. Vanguard’s growth in index funds has put pressure on fees for actively-managed mutual funds. It remains to be seen what its move into private equity portends for fees there.

Competitive pressure is not restricted to the general partners of private equity firms but also extends to the investors, or limited partners, in the funds. Gaining access to leading funds is tough as the funds are commonly oversubscribed or completely closed to new investors. One potential solution is funds of funds, which have performed well in venture capital.¹⁷⁰ Combine high dispersion of returns with a lack of access and it is easy to see why many investors in private equity may be too optimistic about the returns they will earn.

Vanguard looms large on the fee front, but many large institutional investors already mitigate fee pressure through co-investments and direct investments. Direct investments are relevant for sophisticated institutions that are large enough to develop the necessary investing expertise and portfolio diversification without having to hire a fund. Recent research shows that institutional investors earn gross returns on their co-investments that are similar to the returns they earn in funds.¹⁷¹

The timing of general partner compensation also appears to be a relevant factor in determining returns for venture capital funds. Returns for limited partners are higher before and after fees when the agreement is to pay general partners on each deal rather than deferring carried interest until the fund has reached a benchmark return.¹⁷²

As with most corners of the investment world, there will be pressure on fees for many buyout and venture capital firms.¹⁷³ Similar to active managers of public equities, firms that demonstrate skill will be able to charge above-average fees. But investors will likely challenge the lower tier of the industry to lower fees.

Please see Important Disclosures on pages 80-82

Endnotes

- ¹ Carol A. Corrado and Charles R. Hulten, "How Do You Measure a "Technological Revolution?" *American Economic Review*, Vol. 100, No. 2, May 2010, 99-104 and unpublished update to Corrado and Hulten (2010) using methods and sources developed in Corrado and Hao (2013) and in Corrado et al. (2016) and Corrado et al. (2017) for INTAN-Invest© and the SPINTAN project, respectively. The SPINTAN project was funded by the European Commission FP-7 grant agreement 612774.
- ² David F. Swensen, "Investment Philosophy," 1985. See <http://investments.yale.edu/about-the-yio>. For the current asset allocation, see <https://news.yale.edu/2019/09/27/investment-return-57-brings-yale-endowment-value-303-billion>.
- ³ Scott Bauguess, Rachita Gullapalli, and Vladimir Ivanov, "Capital Raising in the U.S.: An Analysis of the Market for Unregistered Securities Offerings, 2009-2017," *Division of Economic and Risk Analysis, U.S. Securities and Exchange Commission*, August 2018.
- ⁴ Craig Doidge, G. Andrew Karolyi, and René M. Stulz, "The U.S. Listing Gap," *Journal of Financial Economics*, Vol. 123, No. 3, March 2017, 464-487.
- ⁵ Warren E. Buffett, "Letter to Shareholders," Berkshire Hathaway Annual Report, 1990. See <https://www.berkshirehathaway.com/letters/1990.html>.
- ⁶ David F. Swensen, *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment* (New York: Free Press, 2000).
- ⁷ Center for Research in Security Prices (CRSP), Jakob Wilhelmus and William Lee, "Companies Rush to Go Private," *Milken Institute*, August 2018, FactSet, and PitchBook.
- ⁸ "Global Private Equity Report 2020," *Bain & Company*, exhibit 1.12 and PitchBook.
- ⁹ For a detailed discussion of this trend, see Michael J. Mauboussin, Dan Callahan, and Darius Majd, "Looking for Easy Games: How Passive Investing Shapes Active Management," *Credit Suisse Global Financial Strategies*, January 4, 2017.
- ¹⁰ Arthur Korteweg, "Risk Adjustment in Private Equity Returns," *Annual Review of Financial Economics*, Vol. 11, December 2019, 131-152; Andrew Ang, Bingxu Chen, William N. Goetzmann, and Ludovic Phalippou, "Estimating Private Equity Returns from Limited Partner Cash Flows," *Journal of Finance*, Vol. 73, No. 4, August 2018, 1751-1783; and Ludovic Phalippou and Oliver Gottschalg, "The Performance of Private Equity Funds," *Review of Financial Studies*, Vol. 22, No. 4, April 2009, 1747-1776.
- ¹¹ Megan Czaronis, William Kinlaw, Mark Kritzman, and David Turkington, "Private Equity and the Leverage Myth," *MIT Sloan School Working Paper 5912-20*, February 11, 2020; Antti Ilmanen, Swati Chandra, and Nicholas McQuinn, "Demystifying Illiquid Assets: Expected Returns for Private Equity," *Journal of Alternative Investments*, Vol. 22, No. 3, Winter 2020, 8-22; Vineet Budhraj and Rui J.P. de Figueiredo, "How Risky Are Illiquid Investments?" *Journal of Portfolio Management*, Vol. 31, No. 2, Winter 2005, 83-93; and Gregory W. Brown, Eric Ghysels, and Oleg Gredil, "Nowcasting Net Asset Values: The Case of Private Equity," *Kenan Institute of Private Enterprise Research Paper No. 20-02*, May 1, 2020. Brown et al. suggest that the beta for buyout funds is 1.05-1.10 and for venture capital funds is 1.20-1.32.
- ¹² For example, see Alexandra Albers-Schoenberg, "Measuring Private Equity Fund Performance," *INSEAD Background Note*, 2019; John C. Kelleher and Justin J. MacCormack, "Internal Rate of Return: A Cautionary Tale," *McKinsey Quarterly*, August 2004; Ludovic Phalippou, "The Hazards of Using IRR to Measure Performance: The Case of Private Equity," *SSRN Working Paper*, September 23, 2009; and Victoria Ivashina and Josh Lerner, *Patient Capital: The Challenges and Promises of Long-Term Investing* (Princeton, NJ: Princeton University Press, 2019), 48-50.
- ¹³ James F. Albertus and Matthew Denes, "Distorting Private Equity Performance: The Rise of Fund Debt," *SSRN Working Paper*, May 26, 2020.
- ¹⁴ Morten Sorensen and Ravi Jagannathan, "The Public Market Equivalent and Private Equity Performance," *Financial Analysts Journal*, Vol. 71, No. 4, July/August 2015, 43-50; Austin M. Long, III and Craig J. Nickels, CFA, "A Private Investment Benchmark," *AIMR Conference on Venture Capital Investing*, February 13, 1996; Steven N. Kaplan and Antoinette Schoar, "Private Equity Performance: Returns, Persistence, and Capital Flows," *Journal of Finance*, Vol. 60, No. 4, August 2005, 1791-1823; and "New Method for Comparing Performance of Private Investments with Public Investments Introduced by Cambridge Associates," October 29, 2013.

- ¹⁵ Jean-François L'Her, Rossitsa Stoyanova, Kathryn Shaw, William Scott, and Charissa Lai, "A Bottom-Up Approach to the Risk-Adjusted Performance of the Buyout Fund Market," *Financial Analysts Journal*, Vol. 72, No. 4, July/August 2016, 36-48 and Gregory W. Brown, Robert S. Harris, Steven N. Kaplan, Tim Jenkinson, and David Robinson, "Private Equity: Accomplishments and Challenges," *Journal of Applied Corporate Finance*, Vol. 32, No. 3, Summer 2020. Returns for KKR's funds launched in 1976, 1980, 1982, 1984, and 1986 averaged more than 30 percent after management and incentive fees. See George P. Baker and George David Smith, *The New Financial Capitalists: Kohlberg Kravis Roberts and the Creation of Corporate Value* (Cambridge, UK: Cambridge University Press, 1998), 207-208.
- ¹⁶ Steven N. Kaplan and Josh Lerner. "Venture Capital Data: Opportunities and Challenges," *Harvard Business School Working Paper*, No. 17-012, August 2016.
- ¹⁷ Tom Nicholas, *VC: An American History* (Cambridge, MA: Harvard University Press, 2019), 278. Of course, public equity market returns are also driven by a small percentage of stocks. See Hendrik Bessembinder, "Do Stocks Outperform Treasury Bills?" *Journal of Financial Economics*, Vol. 129, No. 3, September 2018, 440-457.
- ¹⁸ Nicholas, 11-39.
- ¹⁹ Gregory W. Brown and Steven N. Kaplan, "Have Private Equity Returns Really Declined?" *Journal of Private Equity*, Vol. 22, No. 4, Fall 2019, 11-18.
- ²⁰ Paul Gompers and Josh Lerner, "The Venture Capital Revolution," *Journal of Economic Perspectives*, Vol. 15, No. 2, Spring 2001, 145-168 and Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, "Private Equity Performance: What Do We Know?" *Journal of Finance*, Vol. 69, No. 5, October 2014, 1851-1882.
- ²¹ Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, and Rüdiger Stucke, "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds," *Darden Business School Working Paper No. 2304808*, August 30, 2014 and Reiner Braun, Tim Jenkinson, and Ingo Stoffa, "How Persistent Is Private Equity Performance? Evidence from Deal-Level Data," *Journal of Financial Economics*, Vol. 123, No. 2, February 2017, 273-291.
- ²² Ramana Nanda, Sampsa Samila, and Olav Sorenson, "The Persistent Effect of Initial Success: Evidence from Venture Capital," *Journal of Financial Economics*, Vol. 137, No. 1, July 2020, 231-248.
- ²³ See <https://us.spindices.com/indices/equity/sp-500>.
- ²⁴ "America's Public-Sector Pension Schemes are Trillions of Dollars Short," *Economist*, November 14, 2019 and Robert Novy-Marx and Joshua Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?" *Journal of Finance*, Vol. 66, No. 4, August 2011, 1211-1249.
- ²⁵ Valentin Haddad, Erik Loualiche, and Matthew Plosser, "Buyout Activity: The Impact of Aggregate Discount Rates," *Journal of Finance*, Vol. 72, No. 1, February 2017, 371-414.
- ²⁶ John Plender and Peter Smith, "Top US Pension Fund Aims to Juice Returns via \$80bn Leverage Plan," *Financial Times*, June 15, 2020.
- ²⁷ Ben Unglesbee, "How the Wealthiest Colleges Manage Their Endowments in a Financial Crisis," *Education Dive*, March 19, 2019.
- ²⁸ "A Conversation with David Swensen," *Council on Foreign Relations*, November 14, 2017. See <https://www.cfr.org/event/conversation-david-swensen>.
- ²⁹ A handful of leading institutions have adopted a quantitative formula to determine the payout, often called the "Tobin Rule" after James Tobin, an economist who won the Nobel Prize in Economics. The formula has a stable component, generally last fiscal year's spending adjusted for inflation, and a market term that specifies a rate of distribution times the endowment's assets under management. The institution can then select the weighting for each term. For example, MIT reported a weighting of 80 percent for the stable component and 20 percent for the market component in 2008. See http://web.mit.edu/fnl/volume/205/alexander_herring.html.
- ³⁰ Mark Dixon, "Endowments Should Rethink the 5% Rule," *Pensions & Investments*, May 8, 2017.
- ³¹ Public Plans Database. Exhibit 10 shows historical and assumed annual returns for U.S. state and local government pension plans over nearly 30 years. These plans represented \$4 trillion in AUM in 2019.
- ³² "Preqin Investor Update: Alternative Assets H1 2020," March 4, 2020.
- ³³ Leanna Orr, "David Swensen Is Great for Yale. Is He Horrible for Investing?" *Institutional Investor*, July 31, 2019.
- ³⁴ Josh Lerner, "Yale University Investments Office: February 2015," *Harvard Business School Case 815-124*, April 2015.

- ³⁵ Berk A. Sensoy, Yingdi Wang, and Michael S. Weisbach, "Limited Partner Performance and the Maturing of the Private Equity Industry," *Journal of Financial Economics*, Vol. 112, No. 3, June 2014, 320-343; Marco Da Rin and Ludovic Phalippou, "The Importance of Size in Private Equity: Evidence from a Survey of Limited Partners," *Journal of Financial Intermediation*, Vol. 31, July 2017, 64-76; and Daniel R. Cavagnaro, Berk A. Sensoy, Yingdi Wang, and Michael S. Weisbach, "Measuring Institutional Investors' Skill at Making Private Equity Investments," *Journal of Finance*, Vol. 74, No. 6, December 2019, 3089-3134.
- ³⁶ Taylor D. Nadauld, Berk A. Sensoy, Keith Vorkink, and Michael S. Weisbach, "The Liquidity Cost of Private Equity Investments: Evidence from Secondary Market Transactions," *Journal of Financial Economics*, Vol. 132, No. 3, June 2019, 158-181; Vincent Maurin, David T. Robinson, and Per Strömberg, "A Theory of Liquidity in Private Equity," *Swedish House of Finance Research Paper No. 20-8*, March 3, 2020; Luboš Pástor and Robert F. Stambaugh, "Liquidity Risk and Expected Stock Returns," *Journal of Political Economy*, Vol. 111, No. 3, June 2003, 642-685; Yakov Amihud, Allaudeen Hameed, Wenjin Kang, Huiping Zhang, "The Illiquidity Premium: International Evidence," *Journal of Financial Economics*, Vol. 117, No. 2, August 2015, 350-368; Yakov Amihud, "Illiquidity and Stock Returns: A Revisit," *Critical Finance Review*, Vol. 8, Nos. 1-2, 2019, 203-221; and Luboš Pástor and Robert F. Stambaugh, "Liquidity Risk After 20 Years," *Critical Finance Review*, Vol. 8, Nos. 1-2, 2019, 277-299.
- ³⁷ Geraldine Fabrikant, "Harvard Endowment Loses 22%," *New York Times*, December 3, 2008.
- ³⁸ Andrew Ross Sorkin, "Investment Indigestion at Stanford," *New York Times*, October 5, 2009.
- ³⁹ Ilmanen, Chandra, and McQuinn, "Demystifying Illiquid Assets: Expected Returns for Private Equity," and Erik Stafford, "Replicating Private Equity with Value Investing, Homemade Leverage, and Hold-to-Maturity Accounting," *SSRN Working Paper*, May 20, 2017 and Richard M. Ennis, "Institutional Investment Strategy and Manager Choice: A Critique," *Journal of Portfolio Management*, Vol. 46, No. 5, April 2020, 104-117.
- ⁴⁰ Kyle Welch and Stephen Stubben, "Private Equity's Diversification Illusion: Evidence from Fair Value Accounting," *SSRN Working Paper*, November 2018.
- ⁴¹ Tim Jenkinson, Wayne R. Landsman, Brian R. Rountree, and Kazbi Soonawalla, "Private Equity Net Asset Values and Future Cash Flows," *Accounting Review*, Vol. 95, No. 1, January 2020, 191-210 and Ilia D. Dichev, "What Are Stock Investors' Actual Historical Returns? Evidence from Dollar-Weighted Returns," *American Economic Review*, Vol. 97, No. 1, March 2007, 386-401.
- ⁴² "State of California Public Employees' Retirement System Board of Administration Investment Committee Open Session," December 16, 2019. Research shows that investors are good at seeing through inflated reported returns. See Tim Jenkinson, Miguel Sousa, and Rüdiger Stucke, "How Fair are the Valuations of Private Equity Funds?" *Working Paper*, February 27, 2013 and Gregory W. Brown, Oleg R. Gredil, and Steven N. Kaplan, "Do Private Equity Funds Manipulate Reported Returns?" *Journal of Financial Economics*, Vol. 132, No. 2, May 2019, 267-297.
- ⁴³ Craig Karmin, "College Try: Chicago's Stock Sale—How the University's Unloading of \$600 Million in Shares Divided Its Managers," *Wall Street Journal*, August 25, 2009.
- ⁴⁴ Lynn S. Paine and Suraj Srinivasan, "A Guide to the Big Ideas and Debates in Corporate Governance," *Harvard Business Review*, October 14, 2019.
- ⁴⁵ Paul M. Romer, "Endogenous Technological Change," *Journal of Political Economy*, Vol. 98, No. 5, Pt. 2, October 1990, S71-S102.
- ⁴⁶ "The Soft Revolution: Achieving Growth by Managing Intangibles," *Journal of Applied Corporate Finance*, Volume 11, No. 2, Summer 1998, 8-27.
- ⁴⁷ W. Brian Arthur, *Increasing Returns and Path Dependence in the Economy* (Ann Arbor, MI: University of Michigan Press, 1994) and Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Boston, MA: Harvard Business School Press, 1999).
- ⁴⁸ Jonathan Haskel and Stian Westlake, *Capitalism without Capital: The Rise of the Intangible Economy* (Princeton, NJ: Princeton University Press, 2017). This trend also has implications for capital structures. See Antonio Falato, Dalida Kadyrzhanova, Jae Sim, and Roberto Steri, "Rising Intangible Capital, Shrinking Debt Capacity, and the US Corporate Savings Glut," *Working Paper*, March 18, 2020.
- ⁴⁹ Gerald F. Davis, *The Vanishing American Corporation: Navigating the Hazards of a New Economy* (Oakland, CA: Berrett-Koehler Publishers, 2016), 3.

- ⁵⁰ Jerold L. Zimmerman, "Private Equity, the Rise of Unicorns, and the Reincarnation of Control-based Accounting," *Journal of Applied Corporate Finance*, Vol. 28, No. 3, Summer 2016, 56-67; Anup Srivastava, "Why Have Measures of Earnings Quality Changed Over Time?" *Journal of Accounting and Economics*, Vol. 57, Nos. 2-3, April-May 2014, 196-217; Vijay Govindarajan and Anup Srivastava, "Strategy When Creative Destruction Accelerates," *Tuck School of Business Working Paper No. 2836135*, September 7, 2016; and Leonid Kogan and Dimitris Papanikolaou, "Technological Innovation, Intangible Capital, and Asset Prices," *Annual Review of Financial Economics*, Vol. 11, December 2019, 221-242.
- ⁵¹ David Autor, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen, "The Fall of the Labor Share and the Rise of Superstar Firms," *Quarterly Journal of Economics*, Vol. 135, No. 2, May 2020, 645-709.
- ⁵² Jason Furman and Peter Orszag, "A Firm-Level Perspective on the Role of Rents in the Rise in Inequality," *Presentation at "A Just Society" Centennial Event in Honor of Joseph Stiglitz*, October 16, 2015.
- ⁵³ Gustavo Grullon, Yelena Larkin, and Roni Michaely, "Are U.S. Industries Becoming More Concentrated?" *Review of Finance*, Vol. 23, No. 4, July 2019, 697-743 and Tim Wu, *The Curse of Bigness: Antitrust in the New Gilded Age* (New York: Columbia Global Reports, 2018).
- ⁵⁴ Vijay Govindarajan, Baruch Lev, Anup Srivastava, and Luminita Enache, "The Gap Between Large and Small Companies Is Growing. Why?" *Harvard Business Review*, August 16, 2019.
- ⁵⁵ Michael C. Jensen, "Eclipse of the Public Corporation," *Harvard Business Review*, Vol. 67, No. 5, September-October 1989, 61-74.
- ⁵⁶ Alfred Rappaport, "The Staying Power of the Public Corporation," *Harvard Business Review*, Vol. 68, No. 1, January-February 1990, 96-104 and Craig Doidge, Kathleen M. Kahle, G. Andrew Karolyi, and René M. Stulz, "Eclipse of the Public Corporation or Eclipse of the Public Markets?" *Journal of Applied Corporate Finance*, Vol. 30, No. 1, Winter 2018, 8-16.
- ⁵⁷ Gheorghe Hurduzeu and Maria-Floriana Popescu, "The History of Junk Bonds and Leveraged Buyouts," *Procedia Economics and Finance*, Vol. 32, 2015, 1268-1275; Steven N. Kaplan and Jeremy C. Stein, "The Evolution of Buyout Pricing and Financial Structure in the 1980s," *Quarterly Journal of Economics*, Vol. 108, No. 2, May 1993, 313-357; and Edward I. Altman, "Revisiting the High-Yield Bond Market," *Financial Management*, Vol. 21, No. 2, Summer 1992, 78-92. There is some evidence that bonds issued by buyout firms fare worse than benchmark bonds. See Xiaping Cao, Konan Chan, Kathleen Kahle, "Risk and Performance of Bonds Sponsored by Private Equity Firms," *Journal of Banking & Finance*, Vol. 93, August 2018, 41-53.
- ⁵⁸ Anil Shivdasani and Yihui Wang, "Did Structured Credit Fuel the LBO Boom?" *Journal of Finance*, Vol. 66, No. 4, August 2011, 1291-1328.
- ⁵⁹ Glenn Yago and Donald McCarthy, "The U.S. Leveraged Loan Market: A Primer," *Milken Institute*, October 2004.
- ⁶⁰ Brian Ayashy and Mahdi Rastadz, "Leveraged Buyouts and Financial Distress," *SSRN Working Paper*, July 19, 2019.
- ⁶¹ Michael C. Jensen, "Active Investors, LBOs, and the Privatization of Bankruptcy," *Journal of Applied Corporate Finance*, Vol. 2, No. 1, Spring 1989, 35-44.
- ⁶² Lemma W. Senbet and Tracy Yue Wang, "Corporate Financial Distress and Bankruptcy: A Survey," *Foundations and Trends in Finance*, Vol. 5, No. 4, 2010, 243-335.
- ⁶³ Maria Brouwer, "Reorganization in US and European Bankruptcy Law," *European Journal of Law and Economics*, Vol. 22, No. 1, July 2006, 5-20.
- ⁶⁴ Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, "Law and Finance," *Journal of Political Economy*, Vol. 106, No. 6, December 1998, 1113-1155.
- ⁶⁵ Jeffrey L. Furman, Michael E. Porter, and Scott Stern, "The Determinants of National Innovative Capacity," *Research Policy*, Vol. 31, No. 6, August 2002, 899-933.
- ⁶⁶ Nathan Allen, "The Best Colleges for Successful Entrepreneurs," *Poets & Quants*, August 31, 2018.
- ⁶⁷ Michael E. Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990).
- ⁶⁸ Augustin Landier, "Entrepreneurship and the Stigma of Failure," *SSRN Working Paper*, August 23, 2006.
- ⁶⁹ Klaus Schwab, "The Global Competitiveness Report, 2019," *World Economic Forum Insight Report*.
- ⁷⁰ Ivashina and Lerner, *Patient Capital*, 35.
- ⁷¹ Michael Ewens and Joan Farre-Mensa, "The Deregulation of the Private Equity Markets and the Decline in IPOs," *NBER Working Paper No. 26317*, September 2019.

- ⁷² “Wilshire 5000 Total Market Index,” *Index Fact Sheet*, December 31, 2019. See <https://wilshire.com/Portals/0/analytics/indexes/fact-sheets/wilshire-5000-fact-sheet.pdf>.
- ⁷³ Doidge, Karolyi, and Stulz, “The U.S. Listing Gap” and Gabriele Lattanzio, William L. Megginson, and Ali Sanati, “Listing Gaps, Merger Waves, and the Privatization of American Equity Finance,” *SSRN Working Paper*, March 4, 2020. For a good overview of IPOs, see Michelle Lowry, Roni Michaely, and Ekaterina Volkova, “Initial Public Offerings: A Synthesis of the Literature and Directions for Future Research,” *Foundations and Trends® in Finance*, Vol. 11, No. 3–4, 2017, 154–320.
- ⁷⁴ B. Espen Eckbo and Markus Lithell, “Follow the Assets: Is the US Listing Gap ‘Real’?” *SSRN Working Paper*, May 20, 2020.
- ⁷⁵ Doidge, Karolyi, and Stulz, “The U.S. Listing Gap.”
- ⁷⁶ *Ibid.*, Table 3.
- ⁷⁷ Govindarajan, Lev, Srivastava, and Enache, “The Gap Between Large and Small Companies Is Growing. Why?”
- ⁷⁸ Xiaohui Gao, Jay R. Ritter, and Zhongyan Zhu, “Where Have All the IPOs Gone?” *Journal of Financial and Quantitative Analysis*, Vol. 48, No. 6, December 2013, 1663-1692; Jay R. Ritter, “Reenergizing the IPO Market,” *Journal of Applied Finance*, Vol. 24, No. 1, January 2014, 37-48; and Daniel Ferreira, Gustavo Manso, André C. Silva, “Incentives to Innovate and the Decision to Go Public or Private,” *Review of Financial Studies*, Vol. 27, No. 1, January 2014, 256-300.
- ⁷⁹ Jay R. Ritter, “Why Don’t Issuers Get Upset About Leaving Money on the Table in IPOs?” *Presentation at Direct Listing Conference*, October 1, 2019; Lauren Feiner, “‘The IPO process has devolved,’ tech investor Bill Gurley says as he leads a direct listing movement,” *CNBC*, October 2, 2019; and Miles Zheng, “Direct Listing or IPO? The Choice of Going Public and Welfare Implications Under Adverse Selection,” *SSRN Working Paper*, February 29, 2020.
- ⁸⁰ “Wilshire 5000 Total Market Index,” *Index Fact Sheet*, December 31, 2019. See <https://wilshire.com/Portals/0/analytics/indexes/fact-sheets/wilshire-5000-fact-sheet.pdf>.
- ⁸¹ For the pro case, see Kaitlin Simpson and Wei Dai, “Does a Declining Number of Stocks Affect the Size Premium?” *Dimensional Fund Advisors*, May 2018 and Clifford Asness, Andrea Frazzini, Ronen Israel, Tobias J. Moskowitz, and Lasse H. Pedersen, “Size Matters, If You Control Your Junk,” *Journal of Financial Economics*, Vol. 129, No. 3, September 2018, 479-509. For the mostly con case, see Ron Alquist, Ronen Israel, and Tobias Moskowitz, “Fact, Fiction, and the Size Effect,” *Journal of Portfolio Management*, Vol. 45, No. 1, Fall 2018, 34-61.
- ⁸² Kathleen M. Kahle and René M. Stulz, “Is the US Public Corporation in Trouble?” *Journal of Economic Perspectives*, Vol. 31, No. 3, Summer 2017, 67-88 and René M. Stulz, “Public versus Private Equity,” *Oxford Review of Economic Policy*, Vol. 36, No. 2, Summer 2020, 275-290.
- ⁸³ Alexander Ljungqvist, Lars Persson, and Joacim Tåg, “Private Equity’s Unintended Dark Side: On the Economic Consequences of Excessive Delistings,” *NBER Working Paper 21909*, January 2016.
- ⁸⁴ Patrick Bolton, Tano Santos, and Jose A. Scheinkman, “Cream-Skimming in Financial Markets,” *Journal of Finance*, Vol. 71, No. 2, April 2016, 709-736.
- ⁸⁵ Jay Clayton, “Remarks to the Economic Club of New York,” September 9, 2019 and Robert Schmidt, “Hedge Funds, Unicorns May Open to More Investors in SEC Plan,” *Bloomberg*, December 18, 2019.
- ⁸⁶ Dawn Lim, “Index Funds Are the New Kings of Wall Street,” *Wall Street Journal*, September 18, 2019.
- ⁸⁷ Jonathan B. Berk and Jules H. van Binsbergen, “Measuring Skill in the Mutual Fund Industry,” *Journal of Financial Economics*, Vol. 118, No. 1, October 2015, 1-20.
- ⁸⁸ Michael J. Mauboussin, Dan Callahan, and Darius Majd, “Winning the Easy Game: Skill and the Ability to Extract Value,” *Credit Suisse Global Financial Strategies*, June 11, 2017.
- ⁸⁹ Steven J. Davis, John C. Haltiwanger, Kyle Handley, Ben Lipsius, Josh Lerner, Javier Miranda, “The Economic Effects of Private Equity Buyouts,” *NBER Working Paper No. 26371*, October 7, 2019; Markus Biesinger, Çağatay Bircan, and Alexander Ljungqvist, “Value Creation in Private Equity,” *Working Paper*, May 18, 2020; and Committee on Capital Markets Regulation, “The Impact of Private Equity Buyouts on Productivity and Jobs,” August 2020. Naturally, buyout returns are assessed after adjusting for risk. But there is research that shows that higher debt levels are associated with lower returns. The thinking is that competition for assets plays a large

role in determining the level of leverage. See Reiner Braun, Nicholas Crain, and Anna Gerl, “The Levered Returns of Leveraged Buyouts: The Impact of Competition,” *Working Paper*, July 2017.

⁹⁰ Marc Levinson, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger* (Princeton, NJ: Princeton University Press, 2006), 47.

⁹¹ Bryan Burroughs and John Helyar, *Barbarians at the Gate: The Fall of RJR Nabisco* (New York: Harper & Row, 1990), 133-138 and George Anders, *Merchants of Debt: KKR and the Mortgaging of American Business* (New York: Basic Books, 1992) 7-14. Also, see Baker and Smith, *The New Financial Capitalists*.

⁹² PitchBook as of March 31, 2020.

⁹³ Ivashina and Lerner, *Patient Capital*, 127-136; Lily Fang, Victoria Ivashina, and Josh Lerner, “The Disintermediation of Financial Markets: Direct Investing in Private Equity,” *Journal of Financial Economics*, Vol. 116, No. 1, April 2015, 160-178; and Reiner Braun, Tim Jenkinson, and Christoph Schemmerl, “Adverse Selection and the Performance of Private Equity Co-investments,” *Journal of Financial Economics*, Vol. 136, No. 1, April 2020, 44-62.

⁹⁴ Andrew Metrick and Ayako Yasuda, “The Economics of Private Equity Funds,” *Review of Financial Studies*, Vol. 23, No. 6, June 2010, 2303-2341.

⁹⁵ Ludovic Phalippou, “Performance of Buyout Funds Revisited?” *Review of Finance*, Vol. 18, No. 1, January 2014, 189-218.

⁹⁶ Eugene F. Fama and Kenneth R. French, “The Cross-Section of Expected Stock Returns,” *Journal of Finance*, Vol. 47, No. 2, June 1992, 427-465.

See https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

⁹⁷ See Table II in Ulf Axelson, Morten Sorensen, and Per Strömberg, “Alpha and Beta of Buyout Deals: A Jump CAPM for Long-Term Illiquid Investments,” *Working Paper*, November 2014.

⁹⁸ Brown and Kaplan, “Have Private Equity Returns Really Declined?” and Daniel Rasmussen, “Private Equity: Overvalued and Overrated?” *American Affairs*, Vol. 2, No. 1, Spring 2018.

⁹⁹ “US PE Breakdown: 2019 Annual,” *PitchBook*, January 9, 2020.

¹⁰⁰ Olen Honeyman and Hanna Zhang, “When The Cycle Turns: The Continued Attack Of The EBITDA Add-Back,” *S&P Global Research*, September 19, 2019.

¹⁰¹ Per Strömberg, “The New Demography of Private Equity,” *Working Paper*, December 18, 2007 and “Private Markets Come of Age,” *McKinsey Global Private Markets Review 2019*.

¹⁰² Tim Jenkinson, Stefan Morkoetter, and Thomas Wetzler, “Buy Low, Sell High? Do Private Equity Fund Managers Have Market Abilities?” *University of St. Gallen, School of Finance Research Paper No. 2018/13*, April 30, 2018 and “Global Private Equity Report 2020,” *Bain & Company*, exhibit 1.29.

¹⁰³ Strömberg, “The New Demography of Private Equity,” Sridhar Arcot, Zsuzsanna Fluck, José-Miguel Gaspar, and Ulrich Hege, “Fund Managers Under Pressure: Rationale and Determinants of Secondary Buyouts,” *Journal of Financial Economics*, Vol. 115, No. 1, January 2015, 102-135; Francois Degeorge, Jens Martin, Ludovic Phalippou, “On Secondary Buyouts,” *Journal of Financial Economics*, Vol. 120, No. 1, April 2016, 124-145, and “Global Private Equity Report 2020,” *Bain & Company*, exhibit 1.18. A favorite story is of a European buyout fund that seeks to buy assets from its firm’s old funds. See Simon Clark, “Buyout Firm Buys \$800 Million of Assets From Itself,” *Wall Street Journal*, March 13, 2017.

¹⁰⁴ Mark M. Carhart, “On Persistence in Mutual Fund Performance,” *Journal of Finance*, Vol. 52, No. 1, March 1997, 57-82 and Berk and van Binsbergen, “Measuring Skill in the Mutual Fund Industry.”

¹⁰⁵ Steven N. Kaplan and Berk A. Sensoy, “Private Equity Performance: A Survey,” *Annual Review of Financial Economics*, Vol. 7, December 2015, 597-614; Harris, Jenkinson, Kaplan, and Stucke, “Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds,” and Braun, Jenkinson, and Stoffa, “How Persistent Is Private Equity Performance? Evidence from Deal-Level Data.”

¹⁰⁶ Oliver Gottschalg, “Persistence is Dead...Long Live Persistence,” *2016 Preqin Global Private Equity & Venture Capital Report*, 2016, 31-32; Arthur Korteweg and Morten Sorensen, “Skill and Luck in Private Equity Performance,” *Journal of Financial Economics*, Vol. 124, No. 3, June 2017, 535-562; Andrea Carnelli Dompé, “Persistence Pays Off,” *Pantheon InFocus*, January 2020; and “Structuring a Private Markets Program in the Current Environment,” *Morgan Stanley Investment Management Solutions & Multi-Asset Group*, September 2019. Korteweg and Sorensen find persistence but note, “Performance is noisy, however, making it difficult for

investors to identify the PE funds with top quartile expected future performance and leaving little investable persistence.”

¹⁰⁷ These results are described in Tim Jenkinson, “Is Private Equity Still Outperforming the Public Markets?” *Presentation at Saïd Business School, University of Oxford*, 2016. See <https://www.youtube.com/watch?v=Kqc-hkw5JAE>.

¹⁰⁸ Michael J. Mauboussin, *The Success Equation: Untangling Skill and Luck in Business, Sports, and Investing* (Boston, MA: Harvard Business Review Press, 2012), 53-58.

¹⁰⁹ “Global Private Equity Report 2020,” *Bain & Company*, exhibit 1.23.

¹¹⁰ Amy Whyte, “The Biggest Haul Yet for Private Equity—And Who Got It,” *Institutional Investor*, January 10, 2020.

¹¹¹ Andrea Rossi, “Decreasing Returns or Reversion to the Mean? The Case of Private Equity Fund Growth,” *SSRN Working Paper*, December 30, 2019 and Ivashina and Lerner, *Patient Capital*, 137-138.

¹¹² See exhibit 3 in Ilmanen, Chandra, and McQuinn, “Demystifying Illiquid Assets: Expected Returns for Private Equity.”

¹¹³ Gregory Brown, Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David Robinson, “Private Equity Portfolio Companies: A First Look at Burgiss Holdings Data,” *SSRN Working Paper*, January 17, 2020.

¹¹⁴ This discussion is largely informed by Nicholas, *VC: An American History* and William D. Bygrave and Jeffrey A. Timmons, *Venture Capital at the Crossroads* (Boston, MA: Harvard Business School Press, 1992), 16-30.

¹¹⁵ Carl A. Dauten and Merle T. Welshans, “Investment Development Companies,” *Journal of Finance*, Vol. 6, No. 3, September 1951, 276-290.

¹¹⁶ Barbara Cornelius, “The Institutionalisation of Venture Capital,” *Technovation*, Vol. 25, No. 6, June 2005, 599-608.

¹¹⁷ *Something Ventured*, Directors Daniel Geller and Dayna Goldfine, Miralan Productions, 2011. For a biography of Georges Doriot, see Spencer E. Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital* (Boston, MA: Harvard Business Press, 2008).

¹¹⁸ Bygrave and Timmons, *Venture Capital at the Crossroads*, 20 and Nicholas, *VC: An American History*, Figure 4.4, 131.

¹¹⁹ Paul A. Gompers, “The Rise and Fall of Venture Capital,” *Business and Economic History*, Vol. 23, No. 2, Winter 1994, 1-26.

¹²⁰ Roger G. Ibbotson and Jeffrey F. Jaffe, “‘Hot Issue’ Markets,” *Journal of Finance*, Vol. 30, No. 4, September 1975, 1027-1042.

¹²¹ Roger G. Ibbotson, Jody L. Sindelar, and Jay Ritter, “The Market’s Problems With the Pricing of Initial Public Offerings,” *Journal of Applied Corporate Finance*, Vol. 7, No. 1, Spring 1994, 66-74. The vast majority of these IPOs were of small companies that were listed over the counter. The National Quotation Bureau, a company founded in 1913, reported quotations in the “pink sheets,” so-called because the bids, offers, and closing prices were printed on pink paper. The National Association of Securities Dealers was founded in 1971 and was the first exchange to provide automated quotations electronically. NASDAQ stands for “National Association of Securities Dealers Automated Quotations.” In 1990, the SEC adopted Rule 15c2-6 that attempted to limit the abuses associated with the issue of low-priced, non-NASDAQ over-the-counter securities.

¹²² Bygrave and Timmons, *Venture Capital at the Crossroads*, 25-28.

¹²³ Ian Hathaway, “The Geographic Concentration of Venture Capital(ists),” *Ian Hathaway Blog*, April 28, 2020.

¹²⁴ Paul A. Gompers and Josh Lerner, *The Money of Invention: How Venture Capital Creates New Wealth* (Boston, MA: Harvard Business School Press, 2001), 67.

¹²⁵ David T. Robinson and Berk A. Sensoy, “Cyclicalities, Performance Measurement, and Cash Flow Liquidity in Private Equity,” *Journal of Financial Economics*, Vol. 122, No. 3, December 2016, 521-543; Paul Gompers, Anna Kovner, Josh Lerner, and David Scharfstein, “Venture Capital Investment Cycles: The Impact of Public Markets,” *Journal of Financial Economics*, Vol. 87, No. 1, January 2008, 1-23; and Gregory W. Brown, Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David T. Robinson, “Can Investors Time Their Exposure to Private Equity?” *Kenan Institute of Private Enterprise Research Paper No. 18-26*, January 14, 2019.

¹²⁶ Paul Gompers and Josh Lerner, “Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations,” *Journal of Financial Economics*, Vol. 55, No. 2, February 2000, 281-325.

¹²⁷ Andrea Frazzini and Owen A. Lamont, “Dumb Money: Mutual Fund Flows and the Cross-section of Stock Returns,” *Journal of Financial Economics*, Vol. 88, No. 2, May 2008, 299-322; Paul A. Gompers and Josh Lerner, “What Drives Venture Capital Fundraising?” *NBER Working Paper No. 6906*, January 1999; and Gompers, “The Rise and Fall of Venture Capital.”

¹²⁸ Metrick and Yasuda, “The Economics of Private Equity Funds.”

¹²⁹ Paul A. Gompers and Josh Lerner, “Venture Capital and the Creation of Public Companies: Do Venture Capitalists Really Bring More than Money?” *Journal of Private Equity*, Vol. 1, No. 1, Fall 1997, 15-32 and Christopher B. Barry, Chris J. Muscarella, John W. Peavy III, Michael R. Vetsuypens, “The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going-Public Process,” *Journal of Financial Economics*, Vol. 27, No. 2, October 1990, 447-471.

¹³⁰ Susan Chaplinsky and Swasti Gupta-Mukherjee, “The Decline in Venture-backed IPOs: Implications for Capital Recovery,” in Mario Levis and Silvio Vismara, eds., *Handbook of Research on IPOs* (Cheltenham, UK: Edward Elgar, 2013), 35-56.

¹³¹ Mark A. Lemley and Andrew McCreary, “Exit Strategy,” *Stanford Law and Economics Olin Working Paper # 542*, January 30, 2020.

¹³² Srivastava, “Why Have Measures of Earnings Quality Changed Over Time?”

¹³³ Candy Cheng, “DoorDash Picks Up Another \$100 Million at Nearly \$13 Billion Valuation,” *Bloomberg.com*, November 13, 2019 and Dan Primack, “DoorDash Valued at \$16 billion After New Funding Round,” *Axios*, June 18, 2020.

¹³⁴ Erin Griffith, “DoorDash Faces Its Latest Challenge: Wooing Wall Street,” *New York Times*, March 4, 2020. See <https://www.nytimes.com/2020/03/04/technology/doordash-ipo.html>.

¹³⁵ Maureen Farrell and Greg Bensinger, “Airbnb’s Funding Round Led by Google Capital,” *Wall Street Journal*, September 22, 2016.

¹³⁶ David F. Larcker, Brian Tayan, and Edward Watts, “Cashing It In: Private-Company Exchanges and Employee Stock Sales Prior to IPO,” *Stanford Closer Look Series*, September 12, 2018.

¹³⁷ See <https://www.cbinsights.com/research-unicorn-companies>.

¹³⁸ Aileen Lee, “Welcome To The Unicorn Club: Learning From Billion-Dollar Startups,” *TechCrunch*, November 2, 2013. For more on details on unicorns, see Keith C. Brown and Kenneth Wiles, “The Growing Blessing of Unicorns: The Changing Nature of the Market for Privately Funded Companies,” *Journal of Applied Corporate Finance*, Vol. 32, No. 3, Summer 2020.

¹³⁹ With apologies to Louis Brandeis. See Louis D. Brandeis, *Other People’s Money and How The Bankers Use It* (New York: Frederick A. Stokes Company, 1914), 92. For more on IPO and productivity, Benjamin Bennett, René Stulz, and Zexi Wang, “Does the Stock Market Make Firms More Productive?” *Journal of Financial Economics*, Vol. 136, No. 2, May 2020, 281-306.

¹⁴⁰ Jason Zweig, “How We Should Bust an Investing Myth,” *Wall Street Journal*, September 24, 2019. Also, see Stephanie Stamm, “A Decade of ‘Unicorns’ Ends With a Little Less Magic,” *Wall Street Journal*, December 17, 2019.

¹⁴¹ Paul A. Gompers, Will Gornall, Steven N. Kaplan, and Ilya A. Strebulaev, “How Do Venture Capitalists Make Decisions?” *Journal of Financial Economics*, Volume 135, No.1, January 2020, 169-190.

¹⁴² Will Gornall and Ilya A. Strebulaev, “Squaring Venture Capital Valuations with Reality,” *Journal of Financial Economics*, Vol. 135, No. 1, January 2020, 120-143. For a view from a venture capitalist, see Bill Gurley, “On the Road to Recap: Why the Unicorn Financing Market Just Became Dangerous...For All Involved,” *Above the Crowd*, April 21, 2016.

¹⁴³ Feiner, “‘The IPO Process Has Devolved’ Tech Investor Bill Gurley Says as He Leads a Direct Listing Movement.”

¹⁴⁴ Carolin Bock and Maximilian Schmidt, “The Sooner, The Better? – Venture Capital Exit Decisions in IPOs,” *Frontiers of Entrepreneurship Research*, Vol. 34, No. 2, 2014. This is also true for buyouts. See Tim Jenkinson, Howard Jones, Christian Rauch, and Rüdiger Stucke, “Long Goodbyes: Why Do Private Equity Funds Hold onto Public Equity?” *Working Paper*, February 2020.

¹⁴⁵ Tomasz Tunguz, “How Much Does It Cost to Take Your Startup Public?” *Redpoint Ventures Research*, December 10, 2013.

¹⁴⁶ Ritter, “Why Don’t Issuers Get Upset About Leaving Money on the Table in IPOs?”

- ¹⁴⁷ Kevin Green, "IPO Lockup Expirations: A Persistent Anomaly of Scale," *Working Paper*, January 17, 2017 and Eli Ofek, "The IPO Lock-Up Period: Implications for Market Efficiency and Downward Sloping Demand Curves," *NYU Working Paper No. FIN-99-054*, January 2000.
- ¹⁴⁸ Tim Jenkinson, Howard Jones, and Felix Suntheim, "Quid Pro Quo? What Factors Influence IPO Allocations to Investors?" *Journal of Finance*, Vol. 73, No. 5, October 2018, 2303-2341.
- ¹⁴⁹ Maureen Farrell, "Slack Plans to Follow Spotify on Unconventional IPO Route," *Wall Street Journal*, January 11, 2019 and Maureen Farrell and Anna Rivas, "The IPO Shortcut: A Direct Listing—How Companies Like Slack and Spotify Can Go Public Without a Traditional IPO," *Wall Street Journal*, June 19, 2019.
- ¹⁵⁰ Gompers and Lerner, *The Money of Invention: How Venture Capital Creates New Wealth*, 72, and *PitchBook-NVCA Venture Monitor*, January 13, 2020.
- ¹⁵¹ Hans Swildens and Eric Yee, "The Venture Capital Risk and Return Matrix," *Industry Ventures Blog*, February 7, 2017.
- ¹⁵² Yuliya Chernova and Rolfe Winkler, "Venture Capitalist Bill Gurley Isn't Joining Benchmark's Next Fund," *Wall Street Journal*, April 22, 2020.
- ¹⁵³ Eric J. Savitz, "SoftBank's Problems Are Mounting. Its Next Issue Could Be Ride-Sharing Companies Like Uber," *Barron's*, April 10, 2020.
- ¹⁵⁴ Rossi, "Decreasing Returns or Reversion to the Mean? The Case of Private Equity Fund Growth," and Ivashina and Lerner, *Patient Capital*, 137-138.
- ¹⁵⁵ Robert Harris, Tim Jenkinson, and Rüdiger Stucke, "Are Too Many Private Equity Funds Top Quartile?" *Journal of Applied Corporate Finance*, Vol. 24, No. 4, Fall 2012, 77-89.
- ¹⁵⁶ "A New Equilibrium: Private Equity's Growing Role in Capital Formation and the Critical Implications for Investors," *EY and the Kenan Institute for Private Capital*, October 2019.
- ¹⁵⁷ BlackRock 2020 Institutional Rebalancing Survey. See <https://www.blackrock.com/institutions/en-us/insights/rebalancing-survey>.
- ¹⁵⁸ NEPC's 2019 Q1 Endowment & Foundations Survey Results & Infographic. See <https://www.nepc.com/insights/nepcs-endowments-foundations-april-2019-survey-results-infographic>.
- ¹⁵⁹ U.S. Department of Labor, see <https://www.dol.gov/agencies/ebsa/about-ebsa/our-activities/resource-center/information-letters/06-03-2020> and Christopher Schelling, "The Dangerous Democratization of Alternatives," *Institutional Investor*, February 19, 2020.
- ¹⁶⁰ "Preqin Investor Outlook: Alternative Assets, H1 2020," March 3, 2020.
- ¹⁶¹ Paul Gompers, Steven N. Kaplan, and Vladimir Mukharlyamov, "What Do Private Equity Firms Say They Do?" *Journal of Financial Economics*, Vol. 121, No. 3, September 2016, 449-476.
- ¹⁶² Michael O'Neill, Camille Schmidt and Geoffrey Warren, "Capacity Analysis for Equity Funds," *Journal of Portfolio Management*, Vol. 44, No. 5, Spring 2018, 36-49 and Jonathan B. Berk and Richard C. Green, "Mutual Fund Flows and Performance in Rational Markets," *Journal of Political Economy*, Vol. 112, No. 6, December 2004, 1269-1295.
- ¹⁶³ Gompers and Lerner, *The Money of Invention: How Venture Capital Creates New Wealth*, 117-141 and Paul Gompers and Josh Lerner, *The Venture Capital Cycle, Second Edition* (Cambridge, MA: MIT Press, 2004), 33-63.
- ¹⁶⁴ Paul A. Gompers, "A Note on Valuation in Private Equity," *Harvard Business School Case Study 9-213-034*, July 22, 2015. For the limitations of EBITDA, see Michael J. Mauboussin, "What Does an EV/EBITDA Multiple Mean?" *BlueMountain Capital Investment Research*, September 13, 2018.
- ¹⁶⁵ Paul A. Gompers, "A Note on Valuation in Entrepreneurial Venture," *Harvard Business School Case Study 9-298-082*, January 12, 1999.
- ¹⁶⁶ Eliot Brown, "Wall Street Isn't Buying What Silicon Valley Is Selling," *Wall Street Journal*, May 25, 2019.
- ¹⁶⁷ Steve Kaplan, "What Do We Know About Private Equity Performance?" *Guest Lecture at Miami Herbert Business School*, January 31, 2020. See https://www.youtube.com/watch?v=d_pj1m8StZY.
- ¹⁶⁸ Jonathan Shieber, "Two Sigma Ventures raises \$288M, complementing its \$60B hedge fund parent," *TechCrunch*, January 22, 2020. See <https://techcrunch.com/2020/01/22/two-sigma-ventures-raises-288-million-complementing-its-60-billion-hedge-fund-parent/>.
- ¹⁶⁹ "Vanguard And HarbourVest Announce Private Equity Partnership," February 5, 2020. See

<https://pressroom.vanguard.com/news/Press-Release-VG-HarbourVest-Announce-Private-Equity-Partnership-02052020.html>.

¹⁷⁰ Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, and Rüdiger Stucke, “Financial Intermediation in Private Equity: How Well Do Funds of Funds Perform?” *Journal of Financial Economics*, Vol. 129, No. 2, August 2018, 287-305.

¹⁷¹ Braun, Jenkinson, and Schemmerl, “Adverse Selection and the Performance of Private Equity Co-investments” and Josh Lerner, Jason Mao, Antoinette Schoar, and Nan R. Zhang, “Investing Outside the Box: Evidence from Alternative Vehicles in Private Equity,” *Harvard Business School Working Paper 19-012*, May 18, 2019.

¹⁷² Niklas Hüther, David T. Robinson, Sönke Sievers, and Thomas Hartmann-Wendelse, “Paying for Performance in Private Equity: Evidence from Venture Capital Partnerships,” *Management Science*, Vol. 66, No. 4, April 2020, 1756-1782.

¹⁷³ Ludovic Phalippou, “An Inconvenient Fact: Private Equity Returns & The Billionaire Factory,” *Working Paper*, June 10, 2020.

References

Books

- Anders, George, *Merchants of Debt: KKR and the Mortgaging of American Business* (New York: Basic Books, 1992).
- Ante, Spencer E., *Creative Capital: Georges Doriot and the Birth of Venture Capital* (Boston, MA: Harvard Business Press, 2008).
- Arthur, W. Brian, *Increasing Returns and Path Dependence in the Economy* (Ann Arbor, MI: University of Michigan Press, 1994).
- Baker, George P., and George David Smith, *The New Financial Capitalists: Kohlberg Kravis Roberts and the Creation of Corporate Value* (Cambridge, UK: Cambridge University Press, 1998).
- Brandeis, Louis D., *Other People's Money and How The Bankers Use It* (New York: Frederick A. Stokes Company, 1914).
- Burroughs, Bryan, and John Helyar, *Barbarians at the Gate: The Fall of RJR Nabisco* (New York: Harper & Row, 1990).
- Bygrave, William D., and Jeffrey A. Timmons, *Venture Capital at the Crossroads* (Boston, MA: Harvard Business School Press, 1992).
- Carey, David and John E. Morris, *King of Capital: The Remarkable Rise, Fall, and Rise Again of Steve Schwartzman and Blackstone* (New York: Currency, 2010).
- Cendrowski, Henry, Louis W. Preto, James P. Martin, and Adam A. Wadecki, *Private Equity: History, Governance, and Operations, Second Edition* (Hoboken, NJ: John Wiley & Sons, 2012).
- Davis, Gerald F., *The Vanishing American Corporation: Navigating the Hazards of a New Economy* (Oakland, CA: Berrett-Koehler Publishers, 2016).
- Gaughan, Patrick A., *Mergers, Acquisitions, and Corporate Restructurings, Seventh Edition* (Hoboken, NJ: John Wiley & Sons, 2018).
- Gompers, Paul A., and Josh Lerner, *The Money of Invention: How Venture Capital Creates New Wealth* (Boston, MA: Harvard Business School Press, 2001).
- Gompers, Paul, and Josh Lerner, *The Venture Capital Cycle, Second Edition* (Cambridge, MA: MIT Press, 2004).
- Haskel, Jonathan, and Stian Westlake, *Capitalism without Capital: The Rise of the Intangible Economy* (Princeton, NJ: Princeton University Press, 2017).
- Ivashina, Victoria, and Josh Lerner, *Patient Capital: The Challenges and Promises of Long-Term Investing* (Princeton, NJ: Princeton University Press, 2019).
- Levinson, Marc, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger* (Princeton, NJ: Princeton University Press, 2006).
- Levis, Mario, and Silvio Vismara, eds., *Handbook of Research on IPOs* (Cheltenham, UK: Edward Elgar, 2013).
- Mauboussin, Michael J., *The Success Equation: Untangling Skill and Luck in Business, Sports, and Investing* (Boston, MA: Harvard Business Review Press, 2012).
- Nicholas, Tom, *VC: An American History* (Cambridge, MA: Harvard University Press, 2019).
- Porter, Michael E., *The Competitive Advantage of Nations* (New York: Free Press, 1990).

Shapiro, Carl, and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Boston, MA: Harvard Business School Press, 1999).

Swensen, David F., *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment* (New York: Free Press, 2000).

Wu, Tim, *The Curse of Bigness: Antitrust in the New Gilded Age* (New York: Columbia Global Reports, 2018).

Articles and Papers

"A Conversation with David Swensen," *Council on Foreign Relations*, November 14, 2017.

"A New Equilibrium: Private Equity's Growing Role in Capital Formation and the Critical Implications for Investors," *EY and the Kenan Institute for Private Capital*, October 2019.

Albers-Schoenberg, Alexandra, "Measuring Private Equity Fund Performance," *INSEAD Background Note*, 2019.

Albertus, James F., and Matthew Denes, "Distorting Private Equity Performance: The Rise of Fund Debt," *SSRN Working Paper*, May 26, 2020.

Allen, Nathan, "The Best Colleges for Successful Entrepreneurs," *Poets & Quants*, August 31, 2018.

Alquist, Ron, Ronen Israel, and Tobias Moskowitz, "Fact, Fiction, and the Size Effect," *Journal of Portfolio Management*, Vol. 45, No. 1, Fall 2018, 34-61.

Altman, Edward I., "Revisiting the High-Yield Bond Market," *Financial Management*, Vol. 21, No. 2, Summer 1992, 78-92.

"America's Public-Sector Pension Schemes are Trillions of Dollars Short," *Economist*, November 14, 2019.

Amihud, Yakov, "Illiquidity and Stock Returns: A Revisit," *Critical Finance Review*, Vol. 8, Nos. 1-2, 2019, 203-221.

Amihud, Yakov, Allaudeen Hameed, Wenjin Kang, Huiping Zhang, "The Illiquidity Premium: International Evidence," *Journal of Financial Economics*, Vol. 117, No. 2, August 2015, 350-368.

Ang, Andrew, Bingxu Chen, William N. Goetzmann, and Ludovic Phalippou, "Estimating Private Equity Returns from Limited Partner Cash Flows," *Journal of Finance*, Vol. 73, No. 4, August 2018, 1751-1783.

Arcot, Sridhar, Zsuzsanna Fluck, José-Miguel Gaspar, and Ulrich Hege, "Fund Managers Under Pressure: Rationale and Determinants of Secondary Buyouts," *Journal of Financial Economics*, Vol. 115, No. 1, January 2015, 102-135.

Asness, Clifford, Andrea Frazzini, Ronen Israel, Tobias J. Moskowitz, and Lasse H. Pedersen, "Size Matters, If You Control Your Junk," *Journal of Financial Economics*, Vol. 129, No. 3, September 2018, 479-509.

Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen, "The Fall of the Labor Share and the Rise of Superstar Firms," *Quarterly Journal of Economics*, Vol. 135, No. 2, May 2020, 645-709.

Axelson, Ulf, Tim Jenkinson, Per Strömberg, and Michael S. Weisbach, "Borrow Cheap, Buy High? The Determinants of Leverage and Pricing in Buyouts," *Journal of Finance*, Vol. 68, No. 6, December 2013, 2223-2267.

Axelson, Ulf, Morten Sorensen, and Per Strömberg, "Alpha and Beta of Buyout Deals: A Jump CAPM for Long-Term Illiquid Investments," *Working Paper*, November 2014.

Ayashy, Brian, and Mahdi Rastadz, "Leveraged Buyouts and Financial Distress," *SSRN Working Paper*, July 19, 2019.

Barry, Christopher B., Chris J. Muscarella, John W. Peavy III, Michael R. Vetsuypens, "The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going-Public Process," *Journal of Financial Economics*, Vol. 27, No. 2, October 1990, 447-471.

Bauguess, Scott, Rachita Gullapalli, and Vladimir Ivanov, "Capital Raising in the U.S.: An Analysis of the Market for Unregistered Securities Offerings, 2009-2017," *Division of Economic and Risk Analysis, U.S. Securities and Exchange Commission*, August 2018.

Bennett, Benjamin, René Stulz, and Zexi Wang, “Does the Stock Market Make Firms More Productive?” *Journal of Financial Economics*, Vol. 136, No. 2, May 2020, 281-306.

Berk, Jonathan B., and Richard C. Green, “Mutual Fund Flows and Performance in Rational Markets,” *Journal of Political Economy*, Vol. 112, No. 6, December 2004, 1269-1295.

Berk, Jonathan B., and Jules H. van Binsbergen, “Measuring Skill in the Mutual Fund Industry,” *Journal of Financial Economics*, Vol. 118, No. 1, October 2015, 1-20.

Bessembinder, Hendrik, “Do Stocks Outperform Treasury Bills?” *Journal of Financial Economics*, Vol. 129, No. 3, September 2018, 440-457.

Biesinger, Markus, Çağatay Bircan, and Alexander Ljungqvist, “Value Creation in Private Equity,” *Working Paper*, May 18, 2020.

BlackRock 2020 Institutional Rebalancing Survey.

Bock, Carolin, and Maximilian Schmidt, “The Sooner, The Better? – Venture Capital Exit Decisions in IPOs,” *Frontiers of Entrepreneurship Research*, Vol. 34, No. 2, 2014.

Bolton, Patrick, Tano Santos, and Jose A. Scheinkman, “Cream-Skimming in Financial Markets,” *Journal of Finance*, Vol. 71, No. 2, April 2016, 709-736.

Braun, Reiner, Tim Jenkinson, and Ingo Stoffa, “How Persistent Is Private Equity Performance? Evidence from Deal-Level Data,” *Journal of Financial Economics*, Vol. 123, No. 2, February 2017, 273-291.

Braun, Reiner, Nicholas Crain, and Anna Gerl, “The Levered Returns of Leveraged Buyouts: The Impact of Competition,” *Working Paper*, July 2017.

Braun, Reiner, Tim Jenkinson, and Christoph Schemmerl, “Adverse Selection and the Performance of Private Equity Co-investments,” *Journal of Financial Economics*, Vol. 136, No. 1, April 2020, 44-62.

Brouwer, Maria, “Reorganization in US and European Bankruptcy Law,” *European Journal of Law and Economics*, Vol. 22, No. 1, July 2006, 5-20.

Brown, Eliot. “Wall Street Isn’t Buying What Silicon Valley Is Selling,” *Wall Street Journal*, May 25, 2019.

Brown, Gregory W., Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David T. Robinson, “Can Investors Time Their Exposure to Private Equity?” *Kenan Institute of Private Enterprise Research Paper No. 18-26*, January 14, 2019.

Brown, Gregory W., Oleg R. Gredil, and Steven N. Kaplan, “Do Private Equity Funds Manipulate Reported Returns?” *Journal of Financial Economics*, Vol. 132, No. 2, May 2019, 267-297.

Brown, Gregory W., and Steven N. Kaplan, “Have Private Equity Returns Really Declined?” *Journal of Private Equity*, Vol. 22, No. 4, Fall 2019, 11-18.

Brown, Gregory, Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David Robinson, “Private Equity Portfolio Companies: A First Look at Burgiss Holdings Data,” *SSRN Working Paper*, January 17, 2020.

Brown, Gregory W., Eric Ghysels, and Oleg Gredil, “Nowcasting Net Asset Values: The Case of Private Equity,” *Kenan Institute of Private Enterprise Research Paper No. 20-02*, May 1, 2020.

Brown, Gregory W., Robert S. Harris, Steven N. Kaplan, Tim Jenkinson, and David Robinson, “Private Equity: Accomplishments and Challenges,” *Journal of Applied Corporate Finance*, Vol. 32, No. 3, Summer 2020.

Brown, Keith C., and Kenneth Wiles, “The Growing Blessing of Unicorns: The Changing Nature of the Market for Privately Funded Companies,” *Journal of Applied Corporate Finance*, Vol. 32, No. 3, Summer 2020.

Budhraj, Vineet and Rui J.P. de Figueiredo, "How Risky Are Illiquid Investments?" *Journal of Portfolio Management*, Vol. 31, No. 2, Winter 2005, 83-93.

Buffett, Warren E., "Letter to Shareholders," *Berkshire Hathaway Annual Report*, 1990.

Cao, Xiaping, Konan Chan, Kathleen Kahle, "Risk and Performance of Bonds Sponsored by Private Equity Firms," *Journal of Banking & Finance*, Vol. 93, August 2018, 41-53.

Carhart, Mark M., "On Persistence in Mutual Fund Performance," *Journal of Finance*, Vol. 52, No. 1, March 1997, 57-82.

Cavagnaro, Daniel R., Berk A. Sensoy, Yingdi Wang, and Michael S. Weisbach, "Measuring Institutional Investors' Skill at Making Private Equity Investments," *Journal of Finance*, Vol. 74, No. 6, December 2019, 3089-3134.

Cheng, Candy, "DoorDash Picks Up Another \$100 Million at Nearly \$13 Billion Valuation," *Bloomberg.com*, November 13, 2019.

Chernova, Yuliya, and Rolfe Winkler, "Venture Capitalist Bill Gurley Isn't Joining Benchmark's Next Fund," *Wall Street Journal*, April 22, 2020.

Clark, Simon, "Buyout Firm Buys \$800 Million of Assets From Itself," *Wall Street Journal*, March 13, 2017.

Clayton, Jay, "Remarks to the Economic Club of New York," September 9, 2019.

Committee on Capital Markets Regulation, "The Impact of Private Equity Buyouts on Productivity and Jobs," August 2020.

Cornelius, Barbara, "The Institutionalisation of Venture Capital," *Technovation*, Vol. 25, No. 6, June 2005, 599-608.

Corrado, Carol A., and Charles R. Hulten, "How Do You Measure a "Technological Revolution?" *American Economic Review*, Vol. 100, No. 2, May 2010, 99-104.

Czaronis, Megan, William Kinlaw, Mark Kritzman, and David Turkington, "Private Equity and the Leverage Myth," *MIT Sloan School Working Paper 5912-20*, February 11, 2020.

Da Rin, Marco, and Ludovic Phalippou, "The Importance of Size in Private Equity: Evidence from a Survey of Limited Partners," *Journal of Financial Intermediation*, Vol. 31, July 2017, 64-76.

Dauten, Carl A., and Merle T. Welshans, "Investment Development Companies," *Journal of Finance*, Vol. 6, No. 3, September 1951, 276-290.

Davis, Steven J., John C. Haltiwanger, Kyle Handley, Ben Lipsius, Josh Lerner, Javier Miranda, "The Economic Effects of Private Equity Buyouts," *NBER Working Paper No. 26371*, October 7, 2019.

Degeorge, Francois, Jens Martin, Ludovic Phalippou, "On Secondary Buyouts," *Journal of Financial Economics*, Vol. 120, No. 1, April 2016, 124-145.

Dichev, Ilia D., "What Are Stock Investors' Actual Historical Returns? Evidence from Dollar-Weighted Returns," *American Economic Review*, Vol. 97, No. 1, March 2007, 386-401.

Dimmock, Stephen G., Neng Wang, and Jinqiang, Yang, "The Endowment Model and Modern Portfolio Theory," *Working Paper*, April 23, 2018.

Dixon, Mark, "Endowments Should Rethink the 5% Rule," *Pensions & Investments*, May 8, 2017.

Doidge, Craig, G. Andrew Karolyi, and René M. Stulz, "The U.S. Listing Gap," *Journal of Financial Economics*, Vol. 123, No. 3, March 2017, 464-487.

Doidge, Craig, Kathleen M. Kahle, G. Andrew Karolyi, and René M. Stulz, "Eclipse of the Public Corporation or Eclipse of the Public Markets?" *Journal of Applied Corporate Finance*, Vol. 30, No. 1, Winter 2018, 8-16.

Dompé, Andrea Carnelli, "Persistence Pays Off," *Pantheon InFocus*, January 2020.

Eckbo, B. Espen, and Markus Lithell, "Follow the Assets: Is the US Listing Gap 'Real'?" *SSRN Working Paper*, May 20, 2020.

Edwards, Alexander, and Maximilian Todtenhaupt, "Capital Gains Taxation and Funding for Start-Ups," *Journal of Financial Economics*, forthcoming.

Ennis, Richard M., "Institutional Investment Strategy and Manager Choice: A Critique," *Journal of Portfolio Management*, Vol. 46, No. 5, April 2020, 104-117.

Ewens, Michael, and Joan Farre-Mensa, "The Deregulation of the Private Equity Markets and the Decline in IPOs," *NBER Working Paper No. 26317*, September 2019.

Fabrikant, Geraldine, "Harvard Endowment Loses 22%," *New York Times*, December 3, 2008.

Falato, Antonio, Dalida Kadyrzhanova, Jae Sim, and Roberto Steri, "Rising Intangible Capital, Shrinking Debt Capacity, and the US Corporate Savings Glut," *Working Paper*, March 18, 2020.

Fama, Eugene F., and Kenneth R. French, "The Cross-Section of Expected Stock Returns," *Journal of Finance*, Vol. 47, No. 2, June 1992, 427-465.

Fang, Lily, Victoria Ivashina, and Josh Lerner, "The Disintermediation of Financial Markets: Direct Investing in Private Equity," *Journal of Financial Economics*, Vol. 116, No. 1, April 2015, 160-178.

Farrell, Maureen, and Greg Bensinger, "Airbnb's Funding Round Led by Google Capital," *Wall Street Journal*, September 22, 2016.

Farrell, Maureen, "Slack Plans to Follow Spotify on Unconventional IPO Route," *Wall Street Journal*, January 11, 2019.

Farrell, Maureen and Anna Rivas, "The IPO Shortcut: A Direct Listing—How Companies Like Slack and Spotify Can Go Public Without a Traditional IPO," *Wall Street Journal*, June 19, 2019.

Feiner, Lauren, "'The IPO process has devolved,' tech investor Bill Gurley says as he leads a direct listing movement," *CNBC*, October 2, 2019.

Ferreira, Daniel, Gustavo Manso, André C. Silva, "Incentives to Innovate and the Decision to Go Public or Private," *Review of Financial Studies*, Vol. 27, No. 1, January 2014, 256-300.

Frazzini, Andrea, and Owen A. Lamont, "Dumb Money: Mutual Fund Flows and the Cross-Section of Stock Returns," *Journal of Financial Economics*, Vol. 88, No. 2, May 2008, 299-322.

Furman, Jason, and Peter Orszag, "A Firm-Level Perspective on the Role of Rents in the Rise in Inequality," *Presentation at "A Just Society" Centennial Event in Honor of Joseph Stiglitz*, October 16, 2015.

Furman, Jeffrey L., Michael E. Porter, and Scott Stern, "The Determinants of National Innovative Capacity," *Research Policy*, Vol. 31, No. 6, August 2002, 899-933.

Gao, Xiaohui, Jay R. Ritter, and Zhongyan Zhu, "Where Have All the IPOs Gone?" *Journal of Financial and Quantitative Analysis*, Vol. 48, No. 6, December 2013, 1663-1692.

"Global Pension Assets Study 2020," *Willis Towers Watson Thinking Ahead Institute*, 2020.

"Global Private Equity Report 2020," *Bain & Company*, 2020.

Gompers, Paul A., "The Rise and Fall of Venture Capital," *Business and Economic History*, Vol. 23, No. 2, Winter 1994, 1-26.

_____, "Grandstanding in the venture capital industry," *Journal of Financial Economics*, Vol. 42, No. 1, September 1996, 133-156.

_____, "A Note on Valuation in Entrepreneurial Venture," *Harvard Business School Case Study 9-298-082*, January 12, 1999.

_____, "A Note on Valuation in Private Equity," *Harvard Business School Case Study 9-213-034*, July 22, 2015.

Gompers, Paul A., and Josh Lerner, "Venture Capital and the Creation of Public Companies: Do Venture Capitalists Really Bring More than Money?" *Journal of Private Equity*, Vol. 1, No. 1, Fall 1997, 15-32.

_____, "What Drives Venture Capital Fundraising?" *NBER Working Paper No. 6906*, January 1999.

_____, "Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations," *Journal of Financial Economics*, Vol. 55, No. 2, February 2000, 281-325.

_____, "The Venture Capital Revolution," *Journal of Economic Perspectives*, Vol. 15, No. 2, Spring 2001, 145-168.

Gompers, Paul, Anna Kovner, Josh Lerner, and David Scharfstein, "Venture Capital Investment Cycles: The Impact of Public Markets," *Journal of Financial Economics*, Vol. 87, No. 1, January 2008, 1-23.

Gompers, Paul, Steven N. Kaplan, and Vladimir Mukharlyamov, "What Do Private Equity Firms Say They Do?" *Journal of Financial Economics*, Vol. 121, No. 3, September 2016, 449-476.

Gompers, Paul A., Will Gornall, Steven N. Kaplan, and Ilya A. Strebulaev, "How Do Venture Capitalists Make Decisions?" *Journal of Financial Economics*, Volume 135, No. 1, January 2020, 169-190.

Gornall, Will, and Ilya A. Strebulaev, "Squaring Venture Capital Valuations with Reality," *Journal of Financial Economics*, Vol. 135, No. 1, January 2020, 120-143.

Gottschalg, Oliver, "Persistence is Dead...Long Live Persistence," *2016 Preqin Global Private Equity & Venture Capital Report*, 2016, 31-32.

Govindarajan, Vijay, and Anup Srivastava, "Strategy When Creative Destruction Accelerates," *Tuck School of Business Working Paper No. 2836135*, September 7, 2016.

Govindarajan, Vijay, Baruch Lev, Anup Srivastava, and Luminita Enache, "The Gap Between Large and Small Companies Is Growing. Why?" *Harvard Business Review*, August 16, 2019.

Green, Kevin, "IPO Lockup Expirations: A Persistent Anomaly of Scale," *Working Paper*, January 17, 2017.

Griffith, Erin, "DoorDash Faces Its Latest Challenge: Wooing Wall Street," *New York Times*, March 4, 2020.

Gruillon, Gustavo, Yelena Larkin, and Roni Michaely, "Are U.S. Industries Becoming More Concentrated?" *Review of Finance*, Vol. 23, No. 4, July 2019, 697-743.

Gurley, Bill, "On the Road to Recap: Why the Unicorn Financing Market Just Became Dangerous...For All Involved," *Above the Crowd*, April 21, 2016.

Haddad, Valentin, Erik Loualiche, and Matthew Plosser, "Buyout Activity: The Impact of Aggregate Discount Rates," *Journal of Finance*, Vol. 72, No. 1, February 2017, 371-414.

Harris, Robert, Tim Jenkinson, and Rüdiger Stucke, "Are Too Many Private Equity Funds Top Quartile?" *Journal of Applied Corporate Finance*, Vol. 24, No. 4, Fall 2012, 77-89.

Harris, Robert S., Tim Jenkinson, Steven N. Kaplan, "Private Equity Performance: What Do We Know?" *Journal of Finance*, Vol. 69, No. 5, October 2014, 1851-1882.

Harris, Robert S., Tim Jenkinson, Steven N. Kaplan and Rüdiger Stucke, "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds," *Darden Business School Working Paper No. 2304808*, August 30, 2014.

Harris, Robert S., Tim Jenkinson, and Steven N. Kaplan, "How Do Private Equity Investments Perform Compared to Public Equity?" *Journal of Investment Management*, Vol. 14, No. 3, Third Quarter 2016, 1-24.

Harris, Robert S., Tim Jenkinson, Steven N. Kaplan, and Rüdiger Stucke, "Financial Intermediation in Private Equity: How Well Do Funds of Funds Perform?" *Journal of Financial Economics*, Vol. 129, No. 2, August 2018, 287-305.

Hathaway, Ian, "The Geographic Concentration of Venture Capital(ists)," *Ian Hathaway Blog*, April 28, 2020.

Honeyman, Olen, and Hanna Zhang, "When The Cycle Turns: The Continued Attack Of The EBITDA Add-Back," *S&P Global Research*, September 19, 2019.

Hüther, Niklas, David T. Robinson, Sönke Sievers, and Thomas Hartmann-Wendelse, "Paying for Performance in Private Equity: Evidence from Venture Capital Partnerships," *Management Science*, Vol. 66, No. 4, April 2020, 1756-1782.

Hurduzeu, Gheorghe, and Maria-Floriana Popescu, "The History of Junk Bonds and Leveraged Buyouts," *Procedia Economics and Finance*, Vol. 32, 2015, 1268-1275.

Ibbotson, Roger G., and Jeffrey F. Jaffe, "'Hot Issue' Markets," *Journal of Finance*, Vol. 30, No. 4, September 1975, 1027-1042.

Ibbotson, Roger G., Jody L. Sindelar, and Jay Ritter, "The Market's Problems With the Pricing of Initial Public Offerings," *Journal of Applied Corporate Finance*, Vol. 7, No. 1, Spring 1994, 66-74.

Ilmanen, Antti, Swati Chandra, and Nicholas McQuinn, "Demystifying Illiquid Assets: Expected Returns for Private Equity," *Journal of Alternative Investments*, Vol. 22, No. 3, Winter 2020, 8-22.

Jasinski, Nicholas, "SPACs Are All the Rage, but These Private-Equity-Like Vehicles Are Complicated. Here's What You Need to Know," *Barron's*, July 31, 2020.

Jenkinson, Tim, "Is Private Equity Still Outperforming the Public Markets?" *Presentation at Saïd Business School, University of Oxford*, 2016.

Jenkinson, Tim, Miguel Sousa, and Rüdiger Stucke, "How Fair are the Valuations of Private Equity Funds?" *Working Paper*, February 27, 2013.

Jenkinson, Tim, Stefan Morkoetter, and Thomas Wetzler, "Buy Low, Sell High? Do Private Equity Fund Managers Have Market Abilities?" *University of St. Gallen, School of Finance Research Paper No. 2018/13*, April 30, 2018.

Jenkinson, Tim, Howard Jones, and Felix Suntheim, "Quid Pro Quo? What Factors Influence IPO Allocations to Investors?" *Journal of Finance*, Vol. 73, No. 5, October 2018, 2303-2341.

Jenkinson, Tim, Wayne R. Landsman, Brian R. Rountree, and Kazbi Soonawalla, "Private Equity Net Asset Values and Future Cash Flows," *Accounting Review*, Vol. 95, No. 1, January 2020, 191-210.

Jenkinson, Tim, Howard Jones, Christian Rauch, and Rüdiger Stucke, "Long Goodbyes: Why Do Private Equity Funds Hold onto Public Equity?" *Working Paper*, February 2020.

Jensen, Michael C., "Eclipse of the Public Corporation," *Harvard Business Review*, Vol. 67, No. 5, September-October 1989, 61-74.

_____, "Active Investors, LBOs, and the Privatization of Bankruptcy," *Journal of Applied Corporate Finance*, Vol. 2, No. 1, Spring 1989, 35-44.

Kahle, Kathleen M., and René M. Stulz, "Is the US Public Corporation in Trouble?" *Journal of Economic Perspectives*, Vol. 31, No. 3, Summer 2017, 67-88.

Kaplan, Steve, "What Do We Know About Private Equity Performance?" *Guest Lecture at Miami Herbert Business School*, January 31, 2020.

Kaplan, Steven N., and Jeremy C. Stein, "The Evolution of Buyout Pricing and Financial Structure in the 1980s," *Quarterly Journal of Economics*, Vol. 108, No. 2, May 1993, 313-357.

Kaplan, Steven N., and Antoinette Schoar, "Private Equity Performance: Returns, Persistence, and Capital Flows," *Journal of Finance*, Vol. 60, No. 4, August 2005, 1791-1823.

Kaplan, Steven N., and Berk A. Sensoy, "Private Equity Performance: A Survey," *Annual Review of Financial Economics*, Vol. 7, December 2015, 597-614.

Kaplan, Steven N., and Josh Lerner. "Venture Capital Data: Opportunities and Challenges," *Harvard Business School Working Paper No. 17-012*, August 2016.

Karmin, Craig, "College Try: Chicago's Stock Sale—How the University's Unloading of \$600 Million in Shares Divided Its Managers," *Wall Street Journal*, August 25, 2009.

Kelleher, John C., and Justin J. MacCormack, "Internal Rate of Return: A Cautionary Tale," *McKinsey Quarterly*, August 2004.

Kogan, Leonid, and Dimitris Papanikolaou, "Technological Innovation, Intangible Capital, and Asset Prices," *Annual Review of Financial Economics*, Vol. 11, December 2019, 221-242.

Korteweg, Arthur, "Risk Adjustment in Private Equity Returns," *Annual Review of Financial Economics*, Vol. 11, December 2019, 131-152.

Korteweg, Arthur, and Morten Sorensen, "Skill and Luck in Private Equity Performance," *Journal of Financial Economics*, Vol. 124, No. 3, June 2017, 535-562.

Landier, Augustin, "Entrepreneurship and the Stigma of Failure," *SSRN Working Paper*, August 23, 2006.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, "Law and Finance," *Journal of Political Economy*, Vol. 106, No. 6, December 1998, 1113-1155.

Larcker, David F., Brian Tayan, and Edward Watts, "Cashing It In: Private-Company Exchanges and Employee Stock Sales Prior to IPO," *Stanford Closer Look Series*, September 12, 2018.

Lattanzio, Gabriele, William L. Megginson, and Ali Sanati, "Listing Gaps, Merger Waves, and the Privatization of American Equity Finance," *SSRN Working Paper*, March 4, 2020.

Lee, Aileen, "Welcome To The Unicorn Club: Learning From Billion-Dollar Startups," *TechCrunch*, November 2, 2013.

Lemley, Mark A., and Andrew McCreary, "Exit Strategy," *Stanford Law and Economics Olin Working Paper # 542*, January 30, 2020.

Lerner, Josh, "Yale University Investments Office: February 2015," *Harvard Business School Case 815-124*, April 2015.

Lerner, Josh, Jason Mao, Antoinette Schoar, and Nan R. Zhang, "Investing Outside the Box: Evidence from Alternative Vehicles in Private Equity," *Harvard Business School Working Paper 19-012*, May 18, 2019.

L'Her, Jean-François, Rossitsa Stoyanova, Kathryn Shaw, William Scott, and Charissa Lai, "A Bottom-Up Approach to the Risk-Adjusted Performance of the Buyout Fund Market," *Financial Analysts Journal*, Vol. 72, No. 4, July/August 2016, 36-48.

Lim, Dawn, "Index Funds Are the New Kings of Wall Street," *Wall Street Journal*, September 18, 2019.

Ljungqvist, Alexander, Lars Persson, and Joacim Tåg, "Private Equity's Unintended Dark Side: On the Economic Consequences of Excessive Delistings," *NBER Working Paper 21909*, January 2016.

Loderer, Claudio, René Stulz, and Urs Waelchli, "Firm Rigidities and the Decline in Growth Opportunities," *Management Science*, Vol. 63, No. 9, September 2017, 2773-3145.

Long, Austin M., III and Craig J. Nickels, CFA, "A Private Investment Benchmark," *AIMR Conference on Venture Capital Investing*, February 13, 1996.

Lowry, Michelle, Roni Michaely, and Ekaterina Volkova, "Initial Public Offerings: A Synthesis of the Literature and Directions for Future Research," *Foundations and Trends® in Finance*, Vol. 11, No. 3-4, 2017, 154-320.

Mauboussin, Michael J., "What Does an EV/EBITDA Multiple Mean?" *BlueMountain Capital Investment Research*, September 13, 2018.

Mauboussin, Michael J., Dan Callahan, and Darius Majd, "Looking for Easy Games: How Passive Investing Shapes Active Management," *Credit Suisse Global Financial Strategies*, January 4, 2017.

_____, "Winning the Easy Game: Skill and the Ability to Extract Value," *Credit Suisse Global Financial Strategies*, June 11, 2017.

Maurin, Vincent, David T. Robinson, and Per Strömberg, "A Theory of Liquidity in Private Equity," *Swedish House of Finance Research Paper No. 20-8*, March 3, 2020.

Metrick, Andrew, and Ayako Yasuda, "The Economics of Private Equity Funds," *Review of Financial Studies*, Vol. 23, No. 6, June 2010, 2303-2341.

Nadauld, Taylor D., Berk A. Sensoy, Keith Vorkink, and Michael S. Weisbach, "The Liquidity Cost of Private Equity Investments: Evidence from Secondary Market Transactions," *Journal of Financial Economics*, Vol. 132, No. 3, June 2019, 158-181.

Nanda, Ramana, Sampsa Samila, and Olav Sorenson, "The Persistent Effect of Initial Success: Evidence from Venture Capital," *Journal of Financial Economics*, Vol. 137, No. 1, July 2020, 231-248.

NEPC's 2019 Q1 Endowment & Foundations Survey Results & Infographic.

"New Method for Comparing Performance of Private Investments with Public Investments Introduced by Cambridge Associates," October 29, 2013.

Novy-Marx, Robert and Joshua Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?" *Journal of Finance*, Vol. 66, No. 4, August 2011, 1211-1249.

Ofek, Eli, "The IPO Lock-Up Period: Implications for Market Efficiency and Downward Sloping Demand Curves," *NYU Working Paper No. FIN-99-054*, January 2000.

O'Neill, Michael, Camille Schmidt and Geoffrey Warren, "Capacity Analysis for Equity Funds," *Journal of Portfolio Management*, Vol. 44, No. 5, Spring 2018, 36-49.

Orr, Leanna, "David Swensen Is Great for Yale. Is He Horrible for Investing?" *Institutional Investor*, July 31, 2019.

Paine, Lynn S., and Suraj Srinivasan, "A Guide to the Big Ideas and Debates in Corporate Governance," *Harvard Business Review*, October 14, 2019.

Pástor, Luboš, and Robert F. Stambaugh, "Liquidity Risk and Expected Stock Returns," *Journal of Political Economy*, Vol. 111, No.3, June 2003, 642-685.

Pástor, Luboš, and Robert F. Stambaugh, "Liquidity Risk After 20 Years," *Critical Finance Review*, Vol. 8, Nos. 1-2, 2019, 277-299.

Phalippou, Ludovic, "An Inconvenient Fact: Private Equity Returns & The Billionaire Factory," *Working Paper*, June 10, 2020.

Phalippou, Ludovic, "Performance of Buyout Funds Revisited?" *Review of Finance*, Vol. 18, No. 1, January 2014, 189-218.

Phalippou, Ludovic, "The Hazards of Using IRR to Measure Performance: The Case of Private Equity," *SSRN Working Paper*, September 23, 2009.

Phalippou, Ludovic, and Oliver Gottschalg, "The Performance of Private Equity Funds," *Review of Financial Studies*, Vol. 22, No. 4, April 2009, 1747-1776.

Plender, John, and Peter Smith, "Top US Pension Fund Aims to Juice Returns via \$80bn Leverage Plan," *Financial Times*, June 15, 2020.

Primack, Dan, "DoorDash Valued at \$16 billion After New Funding Round," *Axios*, June 18, 2020.

"Preqin Investor Update: Alternative Assets H1 2020," March 4, 2020.

"Preqin Investor Outlook: Alternative Assets H1 2020," March 3, 2020.

"Private Markets Come of Age," *McKinsey Global Private Markets Review 2019*.

Rappaport, Alfred, "The Staying Power of the Public Corporation," *Harvard Business Review*, Vol. 68, No. 1, January-February 1990, 96-104.

Ritter, Jay R., "Reenergizing the IPO Market," *Journal of Applied Finance*, Vol. 24, No. 1, January 2014, 37-48.

Ritter, Jay R., "Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs?" *Presentation at Direct Listing Conference*, October 1, 2019.

Robinson, David T., and Berk A. Sensoy, "Cyclicality, Performance Measurement, and Cash Flow Liquidity in Private Equity," *Journal of Financial Economics*, Vol. 122, No. 3, December 2016, 521-543.

Romer, Paul M., "Endogenous Technological Change," *Journal of Political Economy*, Vol. 98, No. 5, Pt. 2, October 1990, S71-S102.

Rossi, Andrea, "Decreasing Returns or Reversion to the Mean? The Case of Private Equity Fund Growth," *SSRN Working Paper*, December 30, 2019.

Ryan, Ronald J. and Frank J. Fabozzi, "The Pension Crisis Revealed," *Journal of Investing*, Fall 2003, 43-48.

Savitz, Eric J., "SoftBank's Problems Are Mounting. Its Next Issue Could Be Ride-Sharing Companies Like Uber," *Barron's*, April 10, 2020.

Schelling, Christopher, "The Dangerous Democratization of Alternatives," *Institutional Investor*, February 19, 2020.

Schmidt, Robert, "Hedge Funds, Unicorns May Open to More Investors in SEC Plan," *Bloomberg*, December 18, 2019.

Schwab, Klaus, "The Global Competitiveness Report, 2019," *World Economic Forum Insight Report*.

Simpson, Kaitlin, and Wei Dai, "Does a Declining Number of Stocks Affect the Size Premium?" *Dimensional Fund Advisors*, May 2018.

- Rasmussen, Daniel, "Private Equity: Overvalued and Overrated?" *American Affairs*, Vol. 2, No. 1, Spring 2018.
- Ross Sorkin, Andrew, "Investment Indigestion at Stanford," *New York Times*, October 5, 2009.
- Senbet, Lemma W., and Tracy Yue Wang, "Corporate Financial Distress and Bankruptcy: A Survey," *Foundations and Trends in Finance*, Vol. 5, No. 4, 2010, 243-335.
- Sensoy, Berk A., Yingdi Wang, and Michael S. Weisbach, "Limited Partner Performance and the Maturing of the Private Equity Industry," *Journal of Financial Economics*, Vol. 112, No. 3, June 2014, 320-343.
- Shieber, Jonathan, "Two Sigma Ventures raises \$288M, complementing its \$60B hedge fund parent," *TechCrunch*, January 22, 2020.
- Shivdasani, Anil, and Yihui Wang, "Did Structured Credit Fuel the LBO Boom?" *Journal of Finance*, Vol. 66, No. 4, August 2011, 1291-1328.
- Sorensen, Morten, and Ravi Jagannathan, "The Public Market Equivalent and Private Equity Performance," *Financial Analysts Journal*, Vol. 71, No. 4, July/August 2015, 43-50.
- Srivastava, Anup, "Why Have Measures of Earnings Quality Changed Over Time?" *Journal of Accounting and Economics*, Vol. 57, Nos. 2-3, April-May 2014, 196-217.
- Stafford, Erik, "Replicating Private Equity with Value Investing, Homemade Leverage, and Hold-to-Maturity Accounting," *SSRN Working Paper*, May 20, 2017.
- Stamm, Stephanie, "A Decade of 'Unicorns' Ends With a Little Less Magic," *Wall Street Journal*, December 17, 2019.
- "State of California Public Employees' Retirement System Board of Administration Investment Committee Open Session," December 16, 2019.
- Strömberg, Per, "The New Demography of Private Equity," *Working Paper*, December 18, 2007.
- "Structuring a Private Markets Program in the Current Environment," *Morgan Stanley Investment Management Solutions & Multi-Asset Group*, September 2019.
- Stulz, René M., "Public versus Private Equity," *Oxford Review of Economic Policy*, Vol. 36, No. 2, Summer 2020, 275-290.
- Swensen, David F., "Investment Philosophy," 1985.
- Swildens, Hans, and Eric Yee, "The Venture Capital Risk and Return Matrix," *Industry Ventures Blog*, February 7, 2017.
- "The Soft Revolution: Achieving Growth by Managing Intangibles," *Journal of Applied Corporate Finance*, Volume 11, No. 2, Summer 1998, 8-27.
- Tunguz, Tomasz, "How Much Does It Cost to Take Your Startup Public?" *Redpoint Ventures Research*, December 10, 2013.
- Unglesbee, Ben, "How the Wealthiest Colleges Manage Their Endowments in a Financial Crisis," *Education Dive*, March 19, 2019.
- "US PE Breakdown: 2019 Annual," *PitchBook*, January 9, 2020.
- "Vanguard And HarbourVest Announce Private Equity Partnership," February 5, 2020.
- Welch, Kyle, and Stephen Stubben, "Private Equity's Diversification Illusion: Evidence from Fair Value Accounting," *SSRN Working Paper*, November 2018.

“What to Know About Direct Listings—From a Banker,” *Morgan Stanley Global Capital Markets*, November 21, 2019.

Whyte, Amy, “The Biggest Haul Yet for Private Equity—And Who Got It,” *Institutional Investor*, January 10, 2020.

Wilhelmus, Jakob, and William Lee, “Companies Rush to Go Private,” *Milken Institute*, August 2018.

Yago, Glenn, and Donald McCarthy, “The U.S. Leveraged Loan Market: A Primer,” *Milken Institute*, October 2004.

Zheng, Miles, “Direct Listing or IPO? The Choice of Going Public and Welfare Implications Under Adverse Selection,” *SSRN Working Paper*, February 29, 2020.

Zimmerman, Jerold L., “Private Equity, the Rise of Unicorns, and the Reincarnation of Control-based Accounting,” *Journal of Applied Corporate Finance*, Vol. 28, No. 3, Summer 2016, 56-67.

Zweig, Jason, “How We Should Bust an Investing Myth,” *Wall Street Journal*, September 24, 2019.

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